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ABSTRACT

This is the report of a project designed to identify useful vocational agriculture curriculum publications and to make them available to Pennsylvania vocational agriculture teachers. A catalogue of selected instructional materials from Illinois, Ohio, and Oklahoma is presented. Each catalogue document is described, its origin is given, and the price is provided. In addition, two teacher's manuals are appended. The first manual, "Agricultural Products I," which is for first-year students, contains five sections: (1) units general to agricultural products processing, (2) fruits, vegetables, and beverages, (3) meats, poultry, and eggs, (4) dairy products, and (5) cereal grain foods. Each unit within a section contains unit objectives and performance objectives. Also, the instructional areas are outlined, and evaluation guidelines and instructional aids are suggested. "Agricultural Products II," for second-year students, contains three sections: (1) fruits, vegetables, and beverages, (2) meats, poultry, and eggs, and (3) dairy products. Units within each section provide student activities and frequently worksheets and/or information sheets. (CSS)

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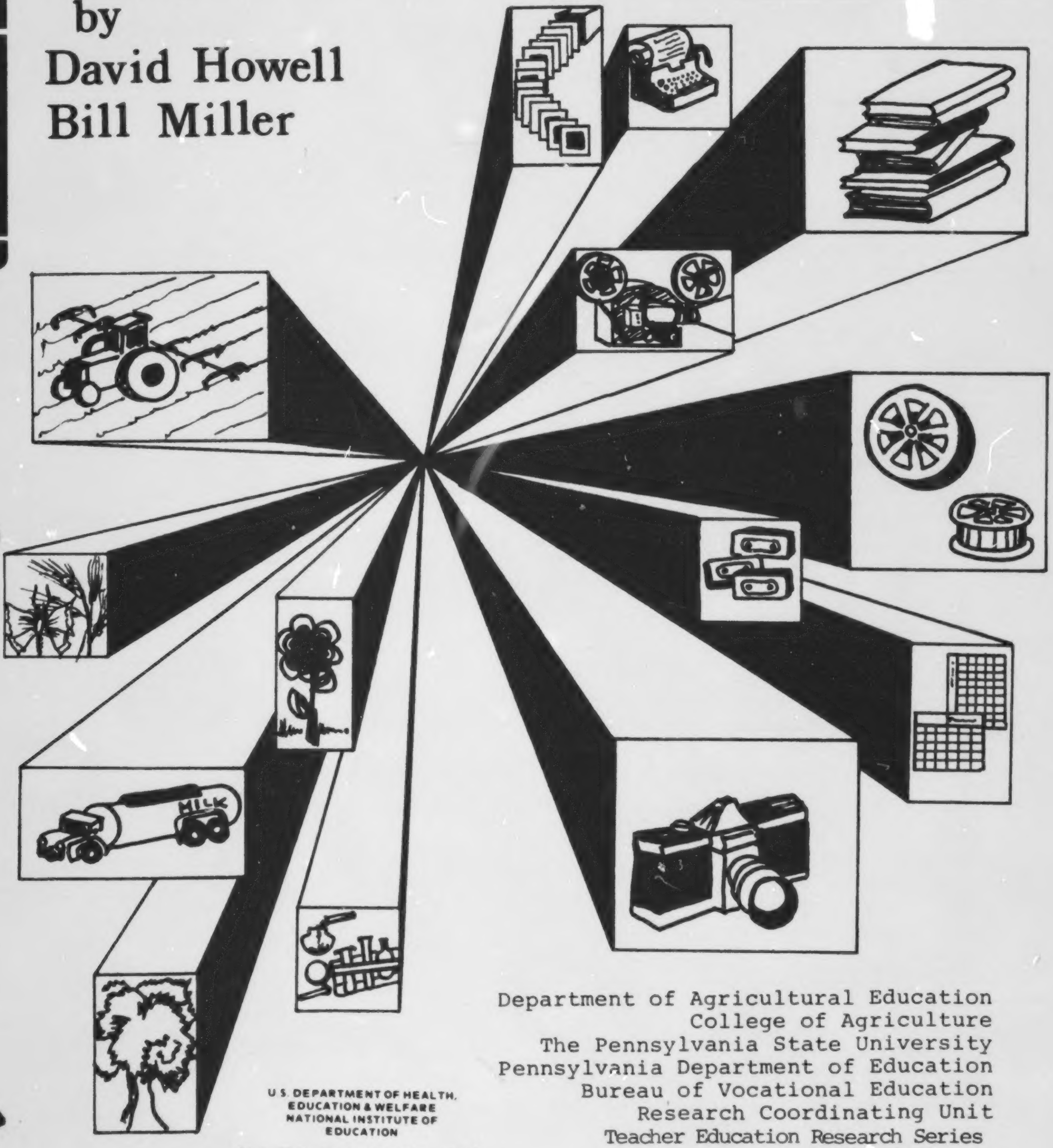
# Curriculum Materials Review and Undergraduate Student Resource Center

by

David Howell
Bill Miller



CE 017 948

Department of Agricultural Education
College of Agriculture
The Pennsylvania State University
Pennsylvania Department of Education
Bureau of Vocational Education
Research Coordinating Unit
Teacher Education Research Series
Volume 19 No. 3

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Final Report

David Howell
William Miller

Project Number 20-7835

Department of Agricultural Education
College of Agriculture
The Pennsylvania State University
University Park, PA 16802

June 1978

Pennsylvania Department of Education
Bureau of Vocational Education
Research Coordinating Unit

Teacher Education Research Series
Volume 19 Number 3
1978

## Acknowledgment

This project was supported by a grant from The Pennsylvania Department of Education, the Bureau of Vocational Education.

Appreciation is expressed to the project's advisory committee which spent many hours in selecting curriculum materials to be used in vocational agriculture classrooms throughout the Commonwealth of Pennsylvania. Thanks are also due to the many curriculum materials centers for making their publications available for our use.

A special thank you to the advisory committee.

| | |
|---|---|
| Ed Aurand | Juniata Mifflin Co. AVTS |
| Mark Bierbower | Kone Area HS |
| Jennifer Brown | Lancaster Co. AVTS Brownstown |
| Ray Crilley | Northwestern JSHS |
| Fred Dillner | Shippensburg Area SHS |
| William Harshman | McGuffey HS |
| Richard Lyons | McGuffey HS |
| Jerry Reichard | Waynesboro Area HS |

## Preface

Teachers of vocational agriculture are always in search of new and better curriculum materials to use in the classroom. Such a search can be greatly aided if an organized effort is made to identify such materials from throughout the nation, evaluate them in terms of their usefulness in Pennsylvania and make them available from one central source. To accomplish these ends, this project was initiated with the funding of The Pennsylvania Department of Education, Bureau of Vocational Education. Teachers are to be informed of the availability of these materials through a catalog, displays of the materials and contacts with the curriculum materials advisory committee.

An unrelated objective was the printing of curriculum guides in Agricultural Supplies and Agricultural Products which were developed by Jerry Reichard and Arba Henry respectfully. These guides will help greatly in the teaching of these areas in the vocational agriculture classroom.

## A. Abstract

### 20-7835 Curriculum Materials Review and Undergraduate Student Resource Center

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(814) 863-0443

$ 22,848 Federal
8,908 Local

1/1/78 to 6/30/78

The purpose of the project was to identify useful curriculum publications relating to vocational agriculture from other states and make them available for use in Pennsylvania Vocational Agriculture programs.

Objectives

1. To review curriculum materials available throughout the United States to assess their usefulness to vo.-ag. programs in Pennsylvania. Materials judged useful will be recommended to Pennsylvania teachers.
2. To stock a curriculum resource center with selected vocational agriculture curriculum materials to be used by teacher education undergraduates in Agricultural Education and for in-service education.
3. To recommend to vocational agriculture teachers available curriculum materials for their use.
4. To identify unmet needs in curriculum resources through the review and selection process.
5. To print and make available curriculum guides in Agricultural Supplies and Agricultural Products.

Outcomes

1. An advisory committee was identified which reviewed curriculum publications from the states of Illinois, Ohio and Oklahoma. From those reviewed 204 publications were identified as useful to Pennsylvania Vocational Agriculture Teachers and made available to them through the Instructional Materials Service of the Department of Agricultural Education at The Pennsylvania State University.

2. Samples of selected materials were made available for preview in the undergraduate curriculum resource for use by undergraduates and vocational agriculture teachers.
3. A catalog was developed and distributed to the teachers and displays were developed during the vocational agriculture teachers conferences.
4. The curriculum guides in Agricultural Supplies and Agricultural Products were printed for distribution.

## Audience

This study will be most helpful to teachers of vocational agriculture.

## Publications and available Materials

Final Report
Instructional Materials Catalog
Sample copies of Out-of-State publications
Curriculum guides in Agricultural Supplies and Agricultural Products

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Appendix B Out-of-State Instructional Materials catalog

Appendix C Agricultural Products I

Appendix D Agricultural Products II

## B. Methods

An instructional materials advisory committee was identified and included representative teachers of vocational agriculture for the seven USOE instructional areas. They met with the Ag. Ed. faculty to identify instructional publications suitable for use in Pennsylvania. This committee met twice during the year.

Curriculum materials centers in the United States were invited to submit their publications for committees review. The evaluation form found in appendix A was completed by the teachers when reviewing the materials.

## Findings and Analysis

Of the publications reviewed, 204 were selected to be included in the initial catalog of out-of-state materials. These materials were all considered to be excellent contributions to provide resources where Pennsylvania has not developed better ones.

## Outcomes

A catalog has been published listing the out-of-state materials approved by the advisory committee (Appendix B). The first group of orders were received in July, consolidated and sent to the respective curriculum labs.

The printing of the Agriculture Products Processing Curriculum Guides and the Agricultural Supplies Curriculum were delayed because of a delay in completing the writing. It was anticipated that Agriculture Products Processing Curriculum Guides would be available in August. The Agricultural Supplies curriculum was expected to be completed in September.

## Recommendations

There is a continual need to review and select new and revised curriculum materials for use in Pennsylvania. The use of the teacher advisory committee is necessary for this purpose. Support is needed to continue such a project if our teachers are to have adequate resourse materials available for use in teaching. The advisory committee must also identify areas where there are no appropriate materials available and Pennsylvania must therefore develop its own.

## Dissemination

A copy of the out-of-state curriculum materials catalog was sent to all vocational agriculture instructors. Copies of the materials listed in the catalog were placed on display in the learning resource center of Armsby at The Pennsylvania State University for use by undergraduates and teachers. A display of these materials was also available during the in-service teachers workshop.

Copies of the curriculum guides for the areas of Agricultural Products Processing and Agricultural Supplies were made available to the vocational agriculture instructors as soon as they were printed.

# APPENDIX A

INSTRUCTIONAL MATERIALS ADVISORY COMMITTEE

Use a separate form for evaluating each reference.

Evaluator______________________________ Date______________________________

Name of Material______________________________________________________________

Source________________________________________________________________________

General comments as to usefulness to teachers in Pa. Is it a duplication of Pa. materials? (Be as brief as possible)

RATING
(circle one)
A - Excellent reference - no question about it
B - Good, but not specific to our needs
C - OK - but it would be good to look for other sources
D - Forget it

# APPENDIX B

# instructional materials

# agricultural education

## 1978

Out-of-State
Instructional Materials

Cut Off Dates for Receiving Orders
July 15 and September 30

The Pennsylvania State University
Department of Agricultural Education
University Park, Pennsylvania 16802

## INSTRUCTIONS FOR ORDERING MATERIALS

The instructional materials listed in this catalog are from various Agricultural Education Services.

The purpose of this service is to assist teachers in developing adequate instructional materials libraries to support the vocational agriculture curriculum in the local departments. Because of the broad range of materials offered, selective ordering is necessary. It is also suggested that teachers refer to the Pennsylvania State Instructional Materials catalog and the catalog of the American Association for Vocational Instructional Materials for other items available from the Agricultural Education Instructional Materials Service at Penn State.

### METHOD OF ORDERING

1. The catalog is a combination listing of materials, price list and order form.
2. Indicate your orders on the Catalog/Order Form.
3. SEND THE CATALOG/ORDER FORM WITH THE SCHOOL PURCHASE ORDER. A school purchase order must accompany all orders.
4. Two copies of the Catalog/Order Form are sent with the initial distribution - One for placing your order and one for your records.

### AVAILABILITY OF MATERIALS

All of the materials were available at the time the catalog was prepared. Due to the temporary nature of some of the publications, there will be a few items that will not be available at the time your order is placed.

### TIME OF ORDERING

None of the materials listed in this catalog are stocked by the Penn State Agricultural Education Instructional Materials Service. Individual orders will be collected until July 15 and September 30 and consolidated at these times, the items are purchased and then distributed to the schools placing orders. Please allow up to two months for delivery.

### PRICING

The prices will be as listed except when our suppliers announce a change in their prices. Shipping charges will be added to the total bill. Handling charges will be as follows: 10% of the total bill for orders of $30.00 or more; 15% of the total bill for orders under $30.00.

### KEY TO MARKINGS

The numbered items are the materials that may be ordered through the Penn State Agricultural Education Instructional Materials Service. The letter following the order number indicates materials suitable for classroom or reference materials. All the materials listed in the catalog have been reviewed by the curriculum advisory committee. The members put much time and effort in reviewing numerous materials. Our thanks go to: Ed Aurand, Mark Bierbower, Jennifer Brown, Ray Crilley, Fred Dillner, William Harshman, Richard Lyons, Jerry Reichard.

| | |
|---|---|
| C | Materials considered suitable for classroom use. However, teachers may want to review a copy before making this decision. |
| A | Materials considered suitable for adult instruction |
| R | Materials considered best suited for teacher reference because of their technical nature or structuring of subject matter. |

### CUTOFF DATES FOR RECEIVING ORDERS

July 15, 1978, and September 30, 1978

Order No. | No. of Copies | Source | Price | Cost

## AGDEX FILING SYSTEM

1-R ______ AVA $ 4.00 ______

AGDEX, A System for Classifying, Indexing and Filing Agricultural Publications. Revised 1969. The AGDEX filing system is a comprehensive numerical system designed for use by teachers of vocational agriculture and county extension agents using a broad spectrum of agricultural publications. AGDEX was designed for nationwide use and can be adapted to the agriculture of widely differing areas. AGDEX is composed of four different sections as follows: Technical Agriculture, Agricultural Occupations, Professional Information, and an Open Section. The system includes a 50-page filing guide and nearly 1200 color-coded gummed labels. AGDEX is published on a nonprofit basis by the American Vocational Association for the Agricultural Education Division as a service to its members.

## FIELD CROPS AGDEX 100

2-C ______ OH 3.75 ______

PLANT GROWTH AND DEVELOPMENT. AGDEX 100/07. 1976. 148 pages. A student manual developed for use by students of vocational agriculture who are studying plant growth and development processes as related to field crop production. Special emphasis is given to the seed-producing crops, such as corn, soybeans and the small grains.

The plant growth processes described are: seed germination, seedling growth, absorption, photosynthesis, respiration, transpiration and reproduction.

The conditions affecting the above-mentioned processes are: water, sunlight, air and temperature.

The purpose of this manual is to describe conditions affecting or influencing crop growth and development processes. The student is then guided in applying this knowledge in making management decisions in the following areas: seed selection, planting practices, tillage practices, fertility practices and pest control.

Suggested student activities and exercises are provided which should assist students in making practical use of the information in this manual.

| Order No. | No. of Copies | | Source | Price | Cost |
|---|---|---|---|---|---|
| 3-C | ______ | Producing High Corn Yields, 12 p. | IL | .50 | ______ |
| 4-C | ______ | Corn Insects and Their Control, 20 p. | IL | .35 | ______ |
| 5-C | ______ | Minimum Tillage, 8 p. | IL | .15 | ______ |
| 6-C | ______ | Storing and Drying Corn, 12 p. | IL | .20 | ______ |
| 7-C | ______ | Improving Permanent Pastures, 8 p. | IL | .15 | ______ |
| 8-C | ______ | Growing Red Clover, 12 p. | IL | .20 | ______ |
| 9-C | ______ | Inoculation of Legumes, 4 p. | IL | .10 | ______ |
| 10-C | ______ | Production High Alfalfa Yields, 20 p. | IL | .35 | ______ |
| 11-C | ______ | Producting Oats, 12 p. | IL | .20 | ______ |

| Order No. | No. of Copies | Source | Price | Cost |
|---|---|---|---|---|
| 12-R | ______ | OH | $ 3.25 | ______ |

INSECT PESTS OF FIELD CROPS AND STORED GRAINS. AGDEX 100/60. 112 pages. Provides descriptions, identification aids, survey methods, and controls for harmful insects. The life stages of the insect are studied and the most appropriate stages at which to apply control measures are considered. The kind and extent of damage is considered. Prepared by Mr. Clarence R. Fridline, Ohio Agricultural Education Curriculum Materials Service. Technical assistance provided by Dr. W.F. Lyon and Dr. B.D. Blair, Extension Entomologists, The Ohio State University: Dr. G.J. Musick, Dr. H.D. Niemczyk, and Dr. R.E. Treece, Research Entomologists, Ohio Agricultural Research and Development Center.

| Order No. | No. of Copies | Source | Price | Cost |
|---|---|---|---|---|
| 13-C | ______ | OH | 2.35 | ______ |

FIELD CROP DISEASES. AGDEX 100/632. 1973. 78 pages. A student manual dealing with plant diseases that present problems to crop farmers of the Midwest. It is designed to assist the student in identifying plant diseases and, when diseases occur, to determine the appropriate action to take. The major headings are as follows: causes and symptoms of diseases; prevention and control of diseases; corn diseases; soybean diseases; small grain diseases; and forage crop diseases. The manual is illustrated with photographs and drawings showing the characteristics of each disease. Prepared by Mr. Clarence R. Fridline, Ohio Agricultural Education Curriculum Materials Service.

| Order No. | No. of Copies | Source | Price | Cost |
|---|---|---|---|---|
| 14-C | ______ | OH | .50 | ______ |

RATE OF PLANTING CORN, A Laboratory Exercise. AGDEX 111/22. 1963. 31 pages. A laboratory exercise designed to be used with a corn planting unit in the shop to check plate selection and accuracy of drop at different speeds of operation. Information concerning the most effective rate to plant corn is included. Nine full page charts that may be made into transparencies are included.

## SLIDES AGDEX 100

| Order No. | No. of Copies | Source | Price | Cost |
|---|---|---|---|---|
| 15-C | ______ | OH | 15.00 | ______ |

SOME IDENTIFYING CHARACTERISTICS OF 70 CROP AND WEED PLANTS. AGDEX 100/40. Revised 1971. A series of 78 color slides with script to accompany the publication. An Aid to the Identification of 70 Crop and Weed Plants. The series includes overall views of plants as well as close-ups of important details.

| Order No. | No. of Copies | Source | Price | Cost |
|---|---|---|---|---|
| 16-C | ______ | OH | 3.00 | ______ |

FUNDAMENTALS OF PLANT IDENTIFICATION. AGDEX 100/40. Revised 1971. A series of 15 color slides and script which illustrate by means of sketches, the important identifying characteristics of plants. The student work sheets of the same name should be used with the series.

## SLIDES AGDEX 100

| Order No. | No. of Copies | | Source | Price | Cost |
|---|---|---|---|---|---|
| 17-R | | Slide Set and Script, | OH | $12.80 | |
| 18-R | | Slide Script only, | OH | .75 | |

COMMON CROP AND WEED SEEDS. AGDEX 100. Revised 1976. A series of 64 color slides and script designed to accompany the publication, Some Identifying Characteristics of 60 Crop and Weed Seeds. The series includes close-up views of the crop and weed seeds included in the Ohio Agronomy Contest.

| Order No. | No. of Copies | | Source | Price | Cost |
|---|---|---|---|---|---|
| 19-R | | Slide Set and Script, | OH | 13.50 | |
| 20-R | | Slide Script only, | OH | .50 | |

SEED PRODUCTION OF CORN, SOYBEANS AND SMALL GRAINS, AGDEX 100/40. 1972. A series of 70 color slides and illustrated script designed to accompany the student reference of the same title. Developed by Mr. Clarence R. Fridline, Ohio Agricultural Education Curriculum Materials Service.

## HORTICULTURE AGDEX 200

| Order No. | No. of Copies | | Source | Price | Cost |
|---|---|---|---|---|---|
| 21-C | | Pruning Fruit Trees, 8 p. | IL | .15 | |
| 22-C | | Pruning and Training Bramble Fruits and Highbush Blueberries, 8 p. | IL | .15 | |
| 23-C | | Selecting Trees for Home Planting, 40 p. | IL | .65 | |
| 24-C | | Transplanting Shade Trees, 12 p. | IL | .20 | |
| 25-C | | Fertilizing and Watering Shade and Ornamental Trees 12 p. | IL | .20 | |
| 26-C | | Pruning Shade Trees, 8 p. | IL | .15 | |
| 27-C | | Tree and Shrub Insects and Their Control, 36 p. | IL | .55 | |
| 28-C | | Producing Plants by Asexual Propagation, 20 p. | IL | .35 | |
| 29-C | | Growing Plants Indoors, 12 p. | IL | .20 | |
| 30-C | | Establishing a Lawn, 8 p. | IL | .15 | |
| 31-C | | Arranging Flowers in Vases and Bowls, 20 p. | IL | .35 | |
| 32-C | | Buying Bedding Plants, 20 p. | IL | .35 | |
| 33-C | | Poinsettias--Care and Propagation, 8 p. | IL | .15 | |
| 34-C | | Planning and Operating a Garden Center, 24 p. | IL | .40 | |
| 35-C | | Producing Poinsettias Commercially, 12 p. | IL | .20 | |
| 36-C | | Growing Lilies, 20 p. | IL | .35 | |
| 37-C | | Turfgrass Diseases and Their Control, 28 p. | IL | .45 | |
| 38-C | | Identifying and Controlling Lawn Insects, 16 p. | IL | .25 | |

## SLIDES AGDEX 200

| Order No. | No. of Copies | | Source | Price | Cost |
|---|---|---|---|---|---|
| 39-C | | Slide Set and Script, | OH | 33.60 | |
| 40-C | | Slide Script only, | OH | 3.00 | |

LANDSCAPE DESIGN. AGDEX 271. 1976. A series of 187 color slides and illustrated script arranged in four sections as follows: (1) Some Principles and Concepts, 47 slides; (2) Site Analysis, 33 slides; (3) The Public Area, 58 slides; and (4) The Private Area, 49 slides. The series presents the type of work that is done by landscape designers and some of their job skills. The slides show landscaping situations and practices correlated to checklists and suggested student activities listed in the script. The slides and script were developed by Dr. Ralph J. Woodin, Professor Emeritus, Dept. of Agricultural Education, The Ohio State University.

| Order No. | No. of Copies | | Source | Price | Cost |
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## SLIDES AGDEX 200

| | | | | | |
|---|---|---|---|---|---|
| 41-C | ______ | Slide Set and Script | OH | $15.40 | ______ |
| 42-C | ______ | Slide Script only | OH | .75 | ______ |

DECIDUOUS SHRUBS IN THE LANDSCAPE. AGDEX 272. 1977. A series of 77 slides and script describing 20 deciduous shrubs recommended in landscaping. The slides show some of the major identifying characteristics of each plant, its parts and how it appears in landscape setting. The script also describes additional characteristics and uses of the plants. The series was developed by Dr. Ralph J. Woodin, Professor Emeritus, Dept. of Agricultural Education, The Ohio State University.

| | | | | | |
|---|---|---|---|---|---|
| 43-C | ______ | Slide Set and Script | OH | 12.00 | ______ |
| 44-C | ______ | Slide Script only | CH | .75 | ______ |

GREENHOUSES AND RELATED STRUCTURES. AGDEX 200/731. 1967. A Series of 62 color slides and script. The objective of this slide is to familiarize students with the various kinds of greenhouse structures and facilities. The slide series is divided into sections and the sections can be viewed at different times with the class. The sections are as follows: greenhouses, use of the greenhouses, greenhouse shapes, covering materials; greenhouse heating, ventilating and cooling; and related structures. Prepared by Mr. Richard Henley of The Ohio State University for the Ohio Agricultural Education Curriculum Materials Service.

| | | | | | |
|---|---|---|---|---|---|
| 45-C | ______ | Slide Set and Script | OH | 11.20 | ______ |
| 46-C | ______ | Illustrated Narration only | OH | .75 | ______ |
| 47-C | ______ | Slides with Narration and Cassette | OH | 14.00 | ______ |
| 48-C | ______ | Cassette only | OH | 3.00 | ______ |

WHAT IS HORTICULTURE? AGDEX 200/950. 1976. A completely revised and expanded slide set replaces one by the same name. The set of 59 slides and illustrated script deals with the nature of the occupational areas of floriculture, fruits and vegetables, garden centers, and landscaping and turf. Characteristics of vocational training programs and related FFA activities for these occupational areas are presented. Revised by John R. Foraker, Ohio Agricultural Education Curriculum Materials Service.

| | | | | | |
|---|---|---|---|---|---|
| 49-C | ______ | Slide Set and Script | OH | 15.00 | ______ |
| 50-C | ______ | Slide Script only | OH | 1.50 | ______ |

FOLIAGE PLANTS. AGDEX 270/33. 1977. The slide series Foliage Plants is a series of 75 slides and script describing the major identifying features of 72 foliage plants. Plants are listed in the script in alphabetical order by their common names. Botanical names and a suggested phonetical pronunciation of the botanical names is included. The script includes a chart of the general characteristics and cultural requirements of 43 plants or related plant groups including: plant usage, light, water and fertilizer requirements, temperature, humidity, disease and propagation.

## FORESTRY AGDEX 300

| Order No. | No. of Copies | | Source | Price | Cost |
|---|---|---|---|---|---|
| 51-C | | Farmstead Windbreaks, 8 p. | IL | $ .15 | |
| 52-C | | Planting and Care of Farm Forests, 16 p. | IL | .25 | |
| 53-C | | Growing and Selling Christmas Trees, 12 p. | IL | .20 | |
| 54-C | | | OH | 4.00 | |

TREE IDENTIFICAITON. AGDEX 300/33. 1975. 156 pages. A description of 55 trees of commercial importance which are commonly found in Ohio and adjoining states. Each description is based upon the following characteristics: leaf or needle, bark, twig, flower, fruit and the conditions under which the tree commonly grows. Five to six pictures are provided for each species. Eight different keys for assisting the student in making identifications are also included. The manual should be valuable for students of forestry and natural resources. Prepared by Richard L. Geesey, Curriculum Materials Specialist, Ohio Agricultural Education Curriculum Materials Service.

## SLIDES AGDEX 300

| | | | | | |
|---|---|---|---|---|---|
| 55-C | | Slide Set and Script | OH | 44.00 | |
| 56-C | | Slide Script only | OH | .75 | |

TREE IDENTIFICATION. AGDEX 300/33. 1976. A series of 220 color slides of the identifying characteristics of fifty-five species of trees found growing in the Central Hardwood Forest Region. The slides illustrate the leaves, bark, twigs and fruit. The tree's silhouette and flowers are included where applicable. The slides are intended to be used with Tree Identification and Teaching Tree Identification listed above. The page numbers indicated in the slide script refer to the pages in the student manual (Tree Identification) which describe the species. This provides for the student manual to be used as the script for the slide series.

## ANIMAL SCIENCE AGDEX 400

| | | | | | |
|---|---|---|---|---|---|
| 57-C | | Buying and Feeding Beef Cattle, 12 p. | IL | .20 | |
| 58-C | | Breeds of Beef Cattle, 12 p. | IL | .20 | |
| 59-R | | Artificially Inseminating Livestock, 8 p. | IL | .15 | |
| 60-R | | Improving Animals Through Breeding, 16 p. | IL | .25 | |
| 61-C | | Raising Dairy Calves, 12 p. | IL | .20 | |
| 62-C | | Raising Dairy Heifers and Bulls, 8 p. | IL | .15 | |
| 63-R | | The Cow's Udder and How It Functions, 12 p. | IL | .20 | |
| 64-C | | Dairy Cattle Breeds, 12 p. | IL | .20 | |
| 65-C | | General Facts on Livestock Feeding, 8 p. | IL | .15 | |
| 66-C | | Minerals for Livestock, 8 p. | IL | .15 | |
| 67-C | | Feed Additives, 8 p. | IL | .15 | |
| 68-R | | Silage as an Animal Feed, 8 p. | IL | .15 | |
| 69-C | | Caring for the Brood Mare and Foal, 8 p. | IL | .15 | |
| 70-C | | Horses and Horsemanship, 44 p. | IL | .70 | |
| 71-C | | Caring for the Sheep Breeding Flock, 8 p. | IL | .15 | |
| 72-C | | Diseases of Sheep, 12 p. | IL | .20 | |
| 73-C | | Internal Parasites of Sheep, 8 p. | IL | .15 | |

| Order No. | No. of Copies | | Source | Price | Cost |
|---|---|---|---|---|---|
| | | ANIMAL SCIENCE AGDEX 400 | | | |
| 74-C | | Feeding Lambs, 8 p. | IL | .15 | |
| 75-R | | Blocking and Trimming Sheep, 8 p. | IL | .15 | |
| 76-C | | Breeds of Sheep, 20 p. | IL | .35 | |
| 77-C | | The Swine Enterprise, 8 p. | IL | .15 | |
| 78-C | | Caring for the Swine Herd During Breeding and Gestation, 4 p. | IL | .10 | |
| 79-C | | Feeds and Feeding Swine, 12 p. | IL | .20 | |
| 80-C | | Caring for the Sow and Litter at Farrowing Time, 8 p. | IL | .15 | |
| 81-C | | Systems of Swine Breeding, 8 p. | IL | .15 | |
| 82-C | | Breeds of Swine, 12 p. | IL | .20 | |
| 83-C | | U.S.D.A. Grades of Swine, 8 p. | IL | .15 | |
| 84-C | | Castrating, Docking and Dehorning, 8 p. | IL | .15 | |
| 85-C | | Rabbit Raising, 12 p. | IL | .20 | |
| 86-C | | Stocking with Quail and Pheasant, 20 p. | IL | .40 | |
| 87-C | | | OH | 3.75 | |

LIVESTOCK BREEDING. AGDEX 400/30. Revised 1977. A student reference (not a workbook) designed to assist students in gaining an understanding of important concepts in livestock breeding. Problems and exercises are used to provide opportunities for students to apply the concepts in realistic situations. The book is well illustrated. Concepts general to all livestock breeding problems are considered as well as specific references to dairy, beef, swine and sheep problems. Developed by Dr. Roger D. Roediger, Assistant Director, Ohio Agricultural Education Curriculum Materials Service.

| | | | | | |
|---|---|---|---|---|---|
| 88-C | | | OH | 1.75 | |

INSECT, TICK AND MITE PESTS OF LIVESTOCK AND PETS. AGDEX 400/600. 1972. 53 pages. Provides information on insects, ticks and mites harmful to livestock, poultry and pets. A description of each insect or other pest includes each life stage, type of metamorphosis, where each life stage will be found, the kind of damage done, and how serious the damage may be. The manual was prepared by Clarence R. Fridline, Ohio Agricultural Education Curriculum Materials Service. Technical assistance was provided by Dr. W.F. Lyon, Extension Entomologist, The Ohio State University, and Dr. R.E. Treece, Research Entomologist, The Ohio Agricultural Research and Development Center.

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| 89-C | | Slide Set and Script | OH | 9.00 | |
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DAIRY CATTLE STERILITY. AGDEX 410/30. 1965. A series of 45 color slides and script. The slides illustrate both normal and abnormal conditions in the male and female reproductive tracts. The series has been organized into lessons that correspond to the lessons in the Hoard's Dairyman book, DAIRY CATTLE STERILITY. Script prepared by Dr. Harry Barr, Dairy Science, The Ohio State University. Slides were provided by Dr. Barr and Michigan State University Animal Reproduction Laboratory.

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GESTATION LACTATION PERIOD MANAGEMENT OF SOWS AND GILTS. AGDEX 440/10. 1966. A series of 23 color slides and script. The series considers both feeding and management suggestions. It might be used to introduce the unit. Local and other research information may be added as needed. Both animated drawings and actual pictures are used. The slides and script were made available by Dr. R.F. Wilson, Animal Science, The Ohio State University.

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THE INSIDE STORY OF MADAM BROOD SOW. AGDEX 440/10. 1972. A series of 28 color slides and illustrated script showing the sow's reproductive tract at progressive stages during gestation. The series was adapted from the Ralston Purina Company filmstrip of the same name. The script was prepared by Herbert W. Barnes, Swine Extension Specialist, The Ohio State University. Some slides were also provided by Mr. Barnes.

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APPRAISING MARKET HOGS FOR CARCASS MERIT. AGDEX 440/40. 1969. A series of 30 color slides and illustrated script intended to assist the student in learning how to appraise market hogs for carcass value. Live hogs of different grades were obtained and photographed. The hogs were slaughtered in the meat laboratory and selected cuts photographed. The series was developed by W.H. Bruner, Extension Specialist, Animal Science, and Dr. B.D. Van Stavern, Extension Meat Specialist, The Ohio State University.

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PROFIT-MAXIMIZING PRINCIPLES, Instructional Units for Vocational Agriculture. AGDEX 820. 1970. 127 pages. Six profit-Maximizing principles are included in this teacher's guide. Illustrations are presented for each of the six principles to be taught. In studying the illustrations, the students should achieve an understanding of the principles and their applications to decision making. The study should strengthen the student's managerial ability. He will know why as well as how and what.

## AGRICULTURAL OCCUPATIONS AGDEX 900

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AGRICULTURAL BUSINESS SUPPLY AND SERVICE. AGDEX 920. Revised 1976. A series of seven student manuals containing a total of 517 pages designed for the agricultural business and service related class. The revision has been completed with the assistance of experienced agricultural business teachers and business representatives. The information has been updated, new materials added, and obsolete materials deleted. The student manuals are designed to provide the student with basic information needed in all of the agricultural businesses. Provision is made for the student to work out practical exercises to provide him or her with experience in conjunction with his or her occupational experience program. Each student in the class should have his or her individual copy of the student manual. Price: The student manuals may be purchased individually at the price indicated with the description of each publication or complete sets of the seven manuals may be ordered at the slightly reduced price of $8.00.

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BUSINESS PRINCIPLES OF LANDSCAPE SERVICE ORGANIZATIONS. AGDEX 953. 1972. A student manual which contains a description of the organization of a landscape service including the business forms used to complete a landscaping job from the first call through the billing procedure for final payment. A problem to provide students with practice is included. The teacher's manual provides suggested solutions for the student practical exercise. Developed by Dr. Ronald C. Kowalka, Ohio Agricultural Education Curriculum Materials Service.

213-R ______ OH 3.25 ______

BASIC FIELD TECHNIQUES IN WILDLIFE MANAGEMENT. AGDEX 962. 1975. 122 pages. This student manual is a revision of a similar manual published by the Minnesota Department of Education. The contents have been updated and changed to meet Ohio wildlife conditions. The student is lead through a series of learning activities that will assist in preparation for employment. Lesson content is focused upon the following: Introductory activities designed to promote a general awareness of wildlife relationships, to acquaint student managers with field observation skills and to provide experience in the interpretation of field information; Basic skill development activities designed to provide practice in using field survey techniques, to introduce the concept of habitat change caused by varying management techniques, and to demonstrate methods of maintaining favorable wildlife habitat; Management ecology activities designed to provide an opportunity to apply skills and concepts acquired in earlier activities to promote awareness of the structure and function of wildlife populations, and to become actively involved in the examination of actual predator-prey interrelationships; and actual management projects to be implemented on a long-term basis that provide for a practical application of the student manager's training and set the stage for realistic habitat restoration projects on private land. Original manuscript prepared by Michael J. Naylon and Carl E. Vogt, Minnesota Environmental Sciences Foundation, Inc. Revised and adapted to Ohio environmental conditions by Richard L. Geesey, Curriculum Materials Specialist, Ohio Agricultural Edcuation Curriculum Materials Service.

214-C ______ OH 3.00 ______

INTRODUCTION TO ENVIRONMENTAL PROTECION AGDEX 980. 1972. 108 pages. A student reference prepared as an introduction for the two-year environmental management program in water treatment operation, wastewater treatment operation, and air pollution inspection. However, it is suggested that the unit could be used with high school students interested in pollution problems that are present in our environment and to assist them in determining how these problems may be solved. This unit is not meant as a complete environmental text, but as a source of information to develop student interest in the various areas of environmental protection. Suggested experiments are included to provide students with a greater understanding of the problems that exist in our environment today. Developed by Dr. David L. Howell and Dr. William S. Farrington, Ohio Agricultural Education Curriculum Materials Service.

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OCCUPATIONAL OPPORTUNITIES IN ENVIRONMENTAL MANAGEMENT. AGDEX 980. 1972. 48 pages. A student reference prepared as an introduction to the careers available to high school graduates in environmental management. The careers include: wastewater treatment operator; water treatment operator; air pollution inspector; solid waste manager; and soil conservation technician. The unit is designed to provide the student with an awareness of the job opportunities and the nature of the work in the above mentioned occupations. Prepared by Dr. John H. Hillison, Dr. David L. Howell and Dr. William S. Farrington, Ohio Agricultural Education Curriculum Materials Service.

216-C ______ OH 3.85 ______

THE AIR POLLUTION INSPECTOR. AGDEX 980. 1974. 150 pages. A student manual designed to accompany a training program in the field of air pollution control. Upon completion of the manual and the course of instruction, the student should be prepared to perform entry level skills as an air pollution inspector. The skills to be achieved are listed in the introduction in each chapter. Prepared by Tressa K. Scott, Curriculum Materials Specialist, Ohio Agricultural Education Curriculum Materials Service.

## HIGH SCHOOL AGDEX .30

217-R ______ OK 9.60 ______

BASIC CORE CURRICULUM GUIDE FOR VOCATIONAL AGRICULTURE I(1970, Revised 1971, 1974) Units of instruction have been developed to cover 60 percent of an agriculture teacher's time in teaching basic information in the following areas: Orientation and Careers, Leadership, Supervised Farm Training, Animal Science, Plant Science, and Agricultural Mechanics.

218-R ______ OK 9.60 ______

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219-R ______ OK 12.00 ______

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220-R ______ OK 9.60 ______

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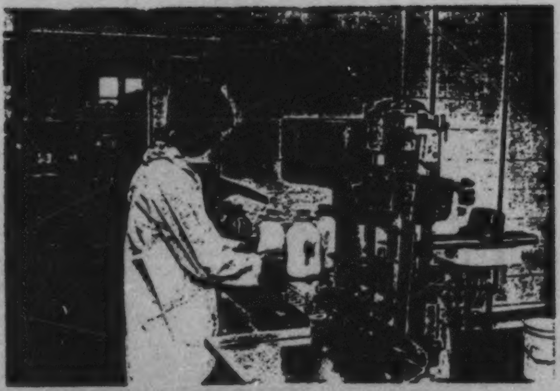
# APPENDIX C

AGDEX .20/54

# Agricultural Products I

## *A Teacher's Manual*



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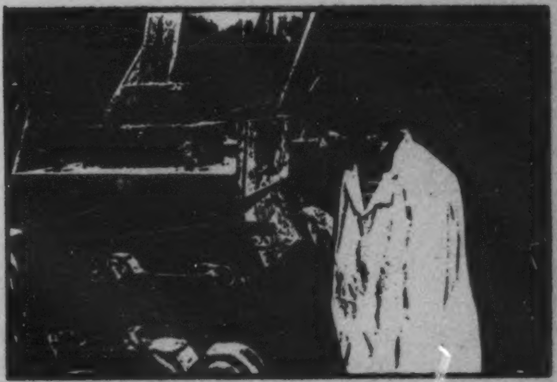

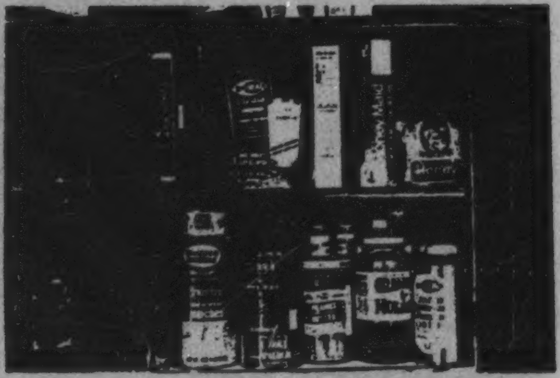

# AGRICULTURAL PRODUCTS I

Teacher Education Series
Vol. 19, No. 5

1978

4

Arba L. Henry
Vocational Agriculture Instructor

and

Jared K. Tyson
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in
Agricultural Education

and

David L. Howell
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The Pennsylvania State University, College of Agriculture,
Department of Agricultural Education, University Park, Pennsylvania

in cooperation with
Agricultural Education Section, Bureau of Vocational Education
Department of Education
Harrisburg, Pennsylvania

and

Agriculture Department
Solanco Senior High School
Quarryville, Pennsylvania

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# Preface

Agricultural Products I is the result of a two-year project that was designed to develop and implement an Agricultural Products Course which is adaptable for incorporation into a comprehensive high school curriculum. The instructional units are designed so that areas in Agricultural Products I may be taught in one year or specific units could be taught for specific lengths of time, if the instructor so desired.

It should be recognized that this course is to be used as a guide, and other areas of instruction could be added.

Agricultural Products I is a series of units in (a) Units General to Agricultural Products Processing, (b) Fruits, Vegetables, and Beverages, (c) Meats, Poultry, and Eggs, (d) Dairy Products, and (e) Cereal Grain Foods.

## ACKNOWLEDGEMENTS

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# INTRODUCTION TO AGRICULTURAL PRODUCTS PROCESSING
## UNIT I

## UNIT OBJECTIVE

Food processing is a broad field with many career opportunities. By exploring the various occupations, learning how agricultural products are processed, and studying the impact of food processing on the economy, the student will be able to determine which career area is of greatest interest to him or her.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Define food science.
2. Distinguish between food scientists and food technologists.
3. Summarize the present world hunger situation.
4. Define malnutrition.
5. Know why food science is important.
6. Have an idea of the scope of the food industry in terms of:
    a. Number of people employed.
    b. Increased technological advances.
    c. New methods of shipping and packaging.
7. Determine what percentage of the dollar is spent on food.
8. Acquire information about employment opportunities in the field of agricultural products.
9. Develop an appreciation of job opportunities and competencies needed for job entry.

## INTRODUCTION TO AGRICULTURAL PRODUCTS
## UNIT I

### INSTRUCTIONAL AREAS

1. Define food science.
    a. Food scientists.
    b. Food technologists.
2. Activities of food scientists.
    a. Help in providing food for hungry nations.
        1. Two billion people do not have enough to eat.
        2. Ten thousand die every year.
    b. Attempt to develop cheap sources of protein.
        1. Dried milk.
        2. Fish flour.
        3. Miltone.
3. Food science is important.
    a. Feeding people under adverse conditions.
    b. Military feeding.
        1. Long time storage.
        2. Reconstitution.
        3. High caloric density.
    c. Soybean proteins.
    d. Storage.
    e. Development of mechanical harvesters.
4. Size of the U.S. food industry.
    a. Employs 1/7 of the working population.
        1. 7 million in production.
        2. 120,000 in marketing.
        3. 1.7 million in processing.
        4. 600,000 in transportation.

5. Abundance of food.
    a. Due to increased efficiency in agricultural occupations.
    b. Each farmer feeds 51 people.
6. Food packaging and shipping.
    a. Food industry consumes 84 percent of all metal cans.
    b. Industry uses 68 percent of all flexible material.
7. Percent of food dollar spent on kinds of food.
    a. Meat products--30 cents.
    b. Fruits and vegetables--22 cents.
    c. Dairy products--18 cents.
    d. Bakery products--15 cents.

## METHODS OF EVALUATION

1. Using a list of agricultural products job titles, have the students match these to the most appropriate food processing area.
2. Have a student summarize the Food Marketing Alert each month.
3. Using current percentages available, have students show by charts or graphs what percent of the food dollar goes for:
    a. Meat products.
    b. Fresh or processed fruits and vegetables.
    c. Dairy products.
    d. Bakery products.

## INSTRUCTIONAL AIDS

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# IDEAL TYPES OF FOOD PRODUCTS
## UNIT II

### UNIT OBJECTIVES

Selection of the ideal type of raw product to be processed into a marketable food product is one of the first steps. In studying this unit, the student, through various planned activities, will develop a better appreciation of the following ideal types of food products: (1) vegetables, fruits, and beverages; (2) meats, poultry, and eggs; (3) dairy products; and (4) cereal grain foods.

### PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Make proper selection of the ideal fruits and vegetables to be used for processing.
2. Demonstrate ability in the selection of beef cattle, dairy cattle, swine, and poultry.
3. Determine a good milk sample by use of sediment and odor test.
4. Make proper selection of grains to be used in cereal foods.

# IDEAL TYPES OF FOOD PRODUCTS
## UNIT II

## INSTRUCTIONAL AREAS

1. Vegetables, fruits, beverages.
   a. Selection as to conformation, color, etc.
   b. Hand sorting and grading of fruits and vegetables.
2. Meats, poultry, eggs.
   a. Live animal grading and judging of dairy cattle, sheep, swine, poultry.
   b. Dressed animal and egg judging.
3. Dairy products.
   a. Sediment and odor scoring of milk sample.
   b. Visual observation of dairy products.
4. Cereal grain foods.
   a. Identification of major cereal grains.
   b. Judging of cereal grains.
5. Judging of ideal types of food products at local fair.
6. Construction of a display area showing the importance of food products.
   a. Fair booth.
   b. Float.
   c. Window display

## METHODS OF EVALUATION

1. Using materials available at a local fair or farm show, have each student judge a class of beef cattle, sheep, dairy, and swine.
2. Have each student tell why he placed the class as he did by use of written or oral reasons.

3. Review judging cards, filmstrips and/or slides in the areas of dairy, swine, beef, and sheep with the students. Then have the class judge animals in the above mentioned areas.

4. From several samples, have each student make proper selection of cereal grains and explain why he judged them as he did by use of oral or written reasons.

## INSTRUCTIONAL AIDS

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# THE FOOD INDUSTRY
## UNIT III

## UNIT OBJECTIVE

The evolution of the food industry as we know it today has its roots deep in our country's early history. From the crude methods of food preservation of the Indian to our modern day freeze-drying methods has been a long and difficult course of development. In studying this unit, the student will develop a better understanding and appreciation of our "modern" industry as compared to that of our forefathers.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Trace the production trends of the food industry and explain how and why it has changed.
2. Explain the principal factors in the changing food supply.
    a. Transportation.
    b. Steamboat.
    c. Erie Canal.
    d. Railroad.
3. Give a description of the early American diet.
4. Explain the purpose of the general store.
5. Describe some of the early food curing procedures.
6. Summarize what effect the industrial revolution had on the food system.
    a. Hard roads.
    b. Automobile (truck).
    c. Airplane.
7. Trace the early processing trends in food preservation.
8. Trace early food preservation.

9. Define farm-retail price spread and its effect on wholesale and retail buying and selling.

10. Explain why location is important to Pennsylvania's fruit and vegetable industry.

    a. Percapita consumption of fruits and vegetables.

    b. Three functional areas of marketing costs:

        (1) Procurement.
        (2) Processing or packing.
        (3) Distribution.

    c. Mainadvantage of establishing a fruit and vegetable processing facility in the Middle Atlantic Region.

11. Discuss how fruits and vegetables are handled in wholesale warehouses.

12. Become familiar with some of the equipment used and general layout design of a wholesale warehouse.

13. Know why we package.

14. Do a canning experiment using fruits and vegetables.

15. Know the different types of canning:

    a. Boiling water bath.

    b. Pressure canner.

16. Summarize USDA Standards for certain fruits and vegetables.

17. Discuss the era of high foods costs.

18. Know the unit operations in the food industry.

    a. Materials handling.

    b. Cleaning.

    c. Separating.

    d. Disintegrating.

  - e. Pumping.
  - f. Mixing.
  - g. Heat exchange: heating.
  - h. Heat exchange: cooling.
  - i. Evaporating.
  - j. Drying.
  - k. Forming.
  - l. Controlling.
  - m. Packaging.

19. Become aware of institutional requirements and how they handle large food purchases.

20. Outline some consumer demands in present consumption trends in the areas of:
    - a. Leisure time.
    - b. Prepared foods.
    - c. Convenience foods.
    - d. Food substitutes

21. Tour several food processing facilities and be able to summarize what was viewed.

# THE FOOD INDUSTRY
## UNIT III

## INSTRUCTIONAL AREAS

1. Production trends.
    a. First farmers produced enough food for their own families.
        1. 97 percent of the population was rural.
        2. Most people grew their own fruits and vegetables.
    b. Today 3 percent of the population live on farms.
    c. Principal factor in changing food supply was improvement of transportation.
        1. Steamboat--1807.
        2. Erie Canal--1825.
        3. Railroads--1830.
    d. Vast majority of the population lived east of the Mississippi.
    e. Diet of rural America was largely seasonal and varied with locality.
    f. General store supplied "specialty items."
    g. Seasonal foods which were available in late 1800s:
        1. Vegetables.
        2. Fruits.
        3. Meats.
    h. Meats were classified as seasonal because there was no refrigeration; thus, animals could only be butchered in cold weather.
        1. Principal meat was pork.
        2. Cattle were a cash crop.
    i. After 1900 a change began to occur:
        1. Introduction of the automobile and truck.
        2. Construction of hard-surfaced roads.
        3. Airplane.
2. Processing trends:
    a. Early processing of meats was done in winter.
    b. The meat, basically pork, was salted and smoked.

   c. Sausages were cooked and covered with melted lard.

   d. Milk, butter, and eggs were kept in a springhouse and cooled by water.

   e. Fruits and vegetables were preserved by keeping them in a root cellar, burying, or drying.

   f. Early canning was crude:

      1. Equipment was poor and expensive.
      2. The canning process was long.

   g. Sugar was the early preservative.

   h. Paraffin later was used as a sealer on canning jars.

3. Distribution and marketing trends.

   a. Wholesale and retail outlets:

      1. Location is important to Pennsylvania's fruit and vegetable industry.
      2. Per capita consumption of fruits is 200 pounds per person per year with vegetables at 220
      3. Procurement, packing, and distribution costs have to be taken into consideration when determining where an industry will locate.
      4. Main advantage in establishing fruit and vegetable processing facilities in the Middle Atlantic Region is its proximity to market.
      5. Main disadvantage is energy source.

   b. Transportation and warehousing.

      1. Equipment used in the receiving and storage area of warehouse.
      2. Loading out operations of wholesale warehouse.
      3. Floor plan of typical fruit and vegetable warehouse facility.

   c. Wholesale and retail buying.

4. Consumption trends.

   a. Consumer demands have changed the consumption trends in the food inudstry.

      1. Leisure time.
      2. Prepared foods.
      3. Convenience foods.
      4. Food substitutes.

b. Institutional demands have created a whole new type of food and packaging systems.

   (1) Schools
   (2) Hospitals.
   (3) Factories.
   (4) Restaurants.

5. Unit operations in the food industry.

   a. Materials handling--the movement of materials from the farm through the processing and marketing phases.

   b. Cleaning--can be as simple as removing dirt to as complicated as removing bacteria from a liquid food.

   c. Separating--may involve separating:

      1. Solid from a solid.
      2. Solid from a liquid.
      3. Liquid from a solid.
      4. Liquid from a liquid.
      5. Gas from a solid or liquid.
      6. One of the most common forms of separation is the hand sorting of fruits and vegetables.

   d. Disintegrating--subdivides large masses of food into smaller units.

      1. Largely associated with the meat industry.
      2. May involve cutting, grinding, pulping, and homogenizing.

   e. Pumping--movement of liquids and solids from one processing step to another.

   f. Mixing.

   g. Heat exchange: heating--foods are heated to:

      1. Destroy microorganisms and preserve the food.
      2. Drive off moisture and develop flavors.
      3. Cocking.
      4. Inactivate toxic substances.

   h. Heat exchange: cooling--primarily done to prolong keeping quality.

   i. Evaporating is used principally to concentrate foods by the removal of water.

      1. Natural evaporation.
      2. Application of heat.

j. Drying--removal of water with minimum damage to the food.

k. Forming--shaping the product in the desired form.

l. Control--measures and adjust essential factors such as:

    (1) Temperature.
    (2) Pressure.

m. Packaging--primarily to protect food.

## METHODS OF EVALUATION

1. Quiz on food industry (Ex. 1).
2. Invite a guest speaker to discuss what demands an institution has on the food industry.
3. Have students summarize the article "Location is Important to Pennsylvania's Fruit and Vegetable Industry" (Ex. 2).
4. Film--"Handling Fruits and Vegetables in Wholesale Warehouses."
5. Film--"Packaging Food For You."
6. Conduct a field trip to a major fruit and vegetable warehouse outlet.
7. Provide a check list of major areas of concern in a distribution center (Ex. 3).
8. Have students do an evaluation of field trip to major warehouse outlet (Ex. 4).
9. Cooperate with food service people or home economics class in a canning experiment with a fruit or vegetable product.
10. Observe unit operations of the food industry while visiting a local cannery.
11. Have students answer questions from the article entitled "Food Issues--A Continuing Controversy" (Ex. 6).

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4. "Handling Fruits and Vegetables in Wholesale Warehouses," Film Library, 31 Roberts Hall, Cornell University, Ithaca, NY.
5. Kramer, Amihud, Food and The Consumer, AVI Publishing Co., Inc., Westport, CT, 1973, Chapters 6, 7, and 8.
6. Brewer, Thomas A., "Location is Important to Pennsylvania's Fruit and Vegetable Industry," Farm Economics, The Pennsylvania State University, Cooperative Extension Service, University Park, PA, August 1975.
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8. "Middleman or Bogeyman," PCA Farming, May-June 1974.
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# THE FOOD INDUSTRY
## UNIT III

### EXAMPLE 1

1. It is estimated that ( 5, 10, 12 ) thousand people die every day for lack of enough food, protein, and vitamins.

2. Define malnutrition.

3. The food industry employs approximately (1/2, 1/3, 1/7) of the working population.

4. What effect did the improvement of transportation have on changing the food supply?

5. Why was meat considered a seasonal product in the late 1800s?

6. Explain an early processing procedure which was used to preserve pork.

7. Explain an early preservation procedure used for fruits and vegetables.

8. Why was there little canning done in the early stages of food preservation?

9. Define: farm-retail price spread

10. If a housewife bought 2 pounds of hamburger for $ .99/lb. and the farmer sold his beef for $ .38/lb., what would be the farm-retail spread?

# THE FOOD INDUSTRY
## UNIT III

## EXAMPLE 2

### Discussion Questions: "Location is Important to Pennsylvania's Fruit and Vegetable Industry"

1. What have been the trends in the per capita consumption of fruits and vegetables?
2. Discuss the following: "The area incurring the lowest production and marketing costs will tend to gain a larger share of the market."
3. Explain the three functional areas of marketing costs.
4. What are the most important costs to be taken into consideration when determining where an industry will be located and where the production and processing or packaging will take place?
5. a. What is the main advantage of establishing a fruit and vegetable processing facility in the Middle Atlantic region?

   b. What is the primary disadvantage?

## THE FOOD INDUSTRY
## UNIT III

### EXAMPLE 3

Major areas of concern in a distribution center

Area

1. Receiving and storage.
    - a. 2 wheel handtruck.
    - b. Tipping-off method.
    - c. Semilive skids.
    - d. Dead skids.
    - e. Pallet.
2. Loading out operations.
    - a. Checker.
    - b. Continuous cycle.
    - c. Belt and transcriber.
3. Warehouse layout and design.

# THE FOOD INDUSTRY
## UNIT III

## EXAMPLE 4

Evaluation of a local food distribution center

Problem 1--A friend tells you that he is considering applying for a job at the local food distribution center. He knows that you have toured the plant and asks you to describe the type of work done there. Do so in a minimum of 50 words.

Problem 2--Safety is a major consideration in all plants. Discuss the many safety precautions observed while touring the warehouse.

# THE FOOD INDUSTRY
## UNIT III

## EXAMPLE 5

### Farm-Retail Price Spread

1. All costs between the farm and the grocery check-out counter account for the farm-retail price spread.

   If a farmer sold his product a few years ago for 40¢ and a housewife paid 70¢ for the product at the market, the price spread would be 30¢. This represents a farm-retail spread of 75 percent.

   If inflation doubles all prices, the farmer may receive 80¢ for his product which the supermarket may sell for $1.40. The result is a price spread of 60¢. However, the farm-retail price spread is the same as in the first example--75 percent.

2. What causes the price spread? Transportation, taxes, insurance, retailing, packaging, labor, etc.

# THE FOOD INDUSTRY
## UNIT III

## EXAMPLE 6

"Food Issues A Continuing Controversy "

1. The Fair Packaging and Labeling Act of 1966 had the following purposes:

    a.
    b.
    c.
    d.
    e.
    f.

2. The Fair Packaging and Labeling Act is often referred to as:

3. What is the Universal product code?

4. Explain the electronic funds transfer system.

5. What is drained weight labeling?

6. List the three major sections of the Consumer Food Act of 1976.

    a.
    b.
    c.

# TYPES OF BUSINESSES
## UNIT IV

## UNIT OBJECTIVE

Agricultural products processing firms are not all owned and managed in the same way. This unit will describe in which ways a processing firm may be owned and operated.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Identify the four basic types of businesses.
    a. Proprietorship.
    b. Partnership.
    c. Corporation.
    d. Cooperative.
2. Tell the importance of the amendment to the Sherman Anti-Trust Act of 1890.
3. Give reasons why co-ops have increased in size.
4. Identify cooperatives, corporations, partnerships, and proprietorships in the local area which are engaged in any phase of the food processing industry.
5. Know the basic structure of producer and processer cooperatives in the area.
6. Draw comparisons between the early co-ops and labor unions.

# TYPES OF BUSINESSES
## UNIT IV

## INSTRUCTIONAL AREAS

1. The most numerous type of business in the United States is the individual proprietorship.
2. The disadvantages of a proprietorship are:
   a. Limited capital.
   b. Risk all on one person.
3. A cooperative member has one vote.
4. The Capper-Volstead Act helped to clarify the status of marketing cooperatives
5. The number of co-ops has decreased, but the volume of business has increased
6. The members own the cooperative.

## METHODS OF EVALUATION

1. Visit an agricultural products firm and have the manager explain to the students how the business is operated.
2. Have several students participate in Co-op Careers Day.
3. Test the students on their knowledge of the American enterprise system.

## INSTRUCTIONAL AIDS

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# HUMAN RELATIONS IN FOOD PROCESSING
## UNIT V

### UNIT OBJECTIVES

Many jobs are lost because of poor human relations between employee, employer, and supervisor. Human relations in today's society is a "two-way street": the employee has a responsibility and loyalty to the employer, and the employer has certain responsibilities to the employees.

After completion of this unit the student should be able to:

1. While preparing for an occupation in agricultural products, conduct a self-evaluation of his physical appearance, speech and conversation, and personality in relations with other persons to the satisfaction of the teacher.

2. While working in a food processing occupation, improve his relations with other personnel as evaluated by the employer using criteria such as appearance and punctuality, dependability, production, initiative, and cooperation.

3. Become familiar with filing applications for employment, preparing for the interview, and conduct during the interview.

# HUMAN RELATIONS IN FOOD PROCESSING
## UNIT IV

## INSTRUCTIONAL AREAS

1. Individual personality.
    a. Physical appearance.
    b. Voice and speech.
    c. Character traits.
2. Relations with fellow workers.
    a. Fair play.
    b. Cooperation.
3. Relations with supervisors.
    a. Loyalty.
    b. Respect.
    c. Cooperation.
4. Accepting responsibility.
5. Relations with customers.
6. Effective use of the telephone.
7. Determining how people fail and succeed on the job.
    a. Identifying common causes of job failure.
    b. Recognizing the various human needs and motives that are satisfied by occupations.

## METHODS OF EVALUATION

1. Have each student conduct a self-inventory of his physical appearance, speech and conversation, and personality.
2. Have each student list six to eight human relation skills that are important in food processing.
3. Have each class member complete the "Human Relations With Fellow Workers" test and discuss the results (Ex. 1).

4. Have each student fill out an application for employment and discuss areas of major concern on the application.

INSTRUCTIONAL AIDS

1. "Hello; I Need to Tell You Something," Bell of Pennsylvania Film Library, Philadelphia, PA.
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# HUMAN RELATIONS IN FOOD PROCESSING
## UNIT V

## EXAMPLE 1

### Test: Human Relations with Fellow Workers

Choose the answer which is MOST correct for each of the following questions.

1. Many occupations deal primarily with machines, equipment or paper work; that is, they deal with things. In business, however, most of the jobs involve close contact with:

   A. employers.
   B. supervisors.
   C. people.
   D. with other workers.

2. As a group, people are very much:

   A. different.
   B. alike.
   C. it is difficult to say.

3. It is possible that the things which you enjoy may:

   A. appeal to others.
   B. not appeal to others.
   C. be distasteful to others.

4. Which of the following do most people have in common?

   A. right to work at a job of their own choice.
   B. desire to get ahead.
   C. desire to be accepted and approved.
   D. all of these.
   E. none of these.

5. The best way to achieve your goals in life is to follow your rights and desires and:

   A. also the wish of your boss.
   B. what your parents say.
   C. the Golden Rule.
   D. just what you feel like doing.

## EXAMPLE 1

6. Do the best work you can for the important jobs and:

   A. don't worry about the little jobs.
   B. let others do the little jobs.
   C. also for the most routine jobs.
   D. everything else will take care of itself.

7. In addition to doing the best work you can, it is important to:

   A. learn as much as you can about your company.
   B. see what you can get on your boss.
   C. keep up on the latest gossip.
   D. be seen and not heard.

8. The statement that "retailing is people" is:

   A. not true.
   B. only partly true.
   C. all true.

9. Which of the following is not a desirable trait of an employee?

   A. sense of humor.
   B. tact.
   C. indifference.
   D. initiative.

10. Exploiting others for our own benefit:

   A. desirable.
   B. OK if you can get away with it.
   C. undesirable.
   D. not too bad.

11. When you are criticized by your superior, it is best to:

   A. act indifferent.
   B. tell him to do it himself.
   C. take it constructively.
   D. shrug it off.

12. Loyalty includes:

   A. working hours only.
   B. both the time to and from work.
   C. all the time.
   D. just when you feel like it.

13. To approach your job with enthusiasm, it is necessary to:

   A. fool the boss.
   B. impress your co-workers.
   C. be glad to be part of the team.

14. It is not necessary to be friendly as long as you:

    A. do your job.
    B. act as though you are.
    C. get to work on time.
    D. none of these.

15. When you have a question, it is best to:

    A. do the job the way you think it should be done.
    B. wait and ask about it later.
    C. not bother your boss with it.
    D. ask about it when it comes up.

16. When you have joined a clique, you have:

    A. picked sides.
    B. helped yourself.
    C. joined the "in" group.
    D. become a member of the team.

17. A good way to get along in your new job is to:

    A. be a "know-it-all."
    B. be willing to learn.
    C. show your co-workers how smart you are.
    D. run to your boss with every question you have.

18. Showing that you are not afraid of work means to:

    A. work as hard as you can.
    B. be willing to tackle any job assigned.
    C. work harder than any of your co-workers.

19. Showing appreciation to fellow workers:

    A. will get you nowhere.
    B. is most important when you are new.
    C. isn't really necessary at all.
    D. is just on the surface.

20. You should start calling your co-workers:

    A. by their first names as soon as possible.
    B. by their nicknames to show you are really "in."
    C. by their last name only.
    D. by their proper names until you have been around awhile or been told to do differently.

21. If you do all of the things we have suggested you will have:

    A. everyone liking you.
    B. a few friends.
    C. a better chance of being well liked.
    D. the reputation for being an apple-polisher.

22. The people you can learn the most from are:

    A. always your bosses.
    B. your best buddies.
    C. those who show an interest in you.
    D. the ones you eat lunch with.

23. Human behavior is usually.

    A. pretty easy to understand.
    B. not too predictable.
    C. easy to predict.
    D. none of your business.

24. The total morale of your business is:

    A. beyond your control.
    B. a matter for the boss.
    C. each employee's problem.
    D. unimportant.

# LEADERSHIP DEVELOPMENT
## UNIT VI

## UNIT OBJECTIVE

Active participation in the FFA will provide the student with opportunities for developing practical training in agriculture, leadership, cooperation, and citizenship.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Using the basic principles of leadership, identify the role of the FFA organization in agricultural products.
2. Using the official FFA manual, identify the history, aims, purposes, and organization of the FFA on the local, county, state, and national level.
3. By actively participating in the organization's business meetings, demonstrate the principles of parliamentary procedure as presented in Robert's Rules of Order or other acceptable reference.
4. Through active participation in the organization, serve effectively as a committee member and/or chairman in planning and carrying out the chapter's program of work.
5. If elected, serve effectively as an officer in the organization by fulfilling the duties of the office to which elected.
6. Through chapter and classroom activities, develop effective public speaking skills so as to be able to make introductions, participate in conversations, and prepare and deliver speeches and talks.
7. Through active participation in the FFA, develop a strong self-concept and a positive attitude toward working in society as evidenced by public and private activities.

## LEADERSHIP DEVELOPMENT
## UNIT VI

## INSTRUCTIONAL AREAS

1. Developing leadership.
    a. Purposes of attaining leadership skills.
    b. Types of leadership.
        1. Formal leadership.
        2. Informal leadership.
    c. Qualities of leadership.
    d. Opportunities for developing leadership abilities.
        1. Home.
        2. School.
        3. Community.
        4. FFA.
2. Learning the place of FFA in agricultural products.
3. Learning the background of the FFA.
    a. Important historical facts.
    b. Aims and purposes.
    c. Colors, emblem, motto, and creed.
4. Governing and financing the FFA.
    a. Local.
    b. County.
    c. State.
    d. National.
5. Attaining FFA membership and degrees.
    a. Types of membership.
    b. Local, county, state and national degrees.

6. Planning and conducting a chapter meeting.
    - a. Identifying officer responsibilities.
    - b. Identifying member responsibilities.
    - c. Conducting the business meeting.
7. Planning and conducting the chapter program of activities.
    - a. Identifying areas to be included.
    - b. Developing a program of activities.
    - c. Carrying out the program of activities.
        1. Identifying chairman responsibilities.
        2. Identifying committee member responsibilities.
8. Performing FFA officer duties and responsibilities.
    - a. Identifying qualifications for local, county, state, and national offices.
    - b. Identifying specific duties of each officer.
    - c. Determining general responsibilities of an officer.
        1. Conducting chapter programs.
        2. Participating in officer meetings.
        3. Participating in leadership activities.
        4. Conducting chapter meeting.
9. Developing proficiency in parliamentary procedure.
    - a. Presiding over meetings.
    - b. Presenting motions correctly.
10. Developing public speaking skills.
    - a. Developing conversation skills.
    - b. Making introductions.
    - c. Preparing a speech or talk.
    - d. Delivering a speech or talk.
11. Determining responsibilities of FFA members.

## METHODS OF EVALUATION

1. Have each student list the qualities of a democratic leader so that attainment of the qualities would result in a person displaying democratic leadership.
2. Conduct a simulated business meeting so that each student becomes familiar with the proper procedure for conducting meetings.
3. Conduct a speaking contest and evaluate each student for his presentation in relation to his speaking ability.
4. Have as many students as possible become involved in at least one FFA contest and evaluate their performance in that contest.

## INSTRUCTIONAL AIDS

1. Bender, Ralph E., The FFA and You, The Interstate Printers and Publishers, Inc., Danville, IL, 1962.
2. Official Manual, Future Farmers of America, Future Farmer Supply Service, Alexandria, VA, 1975.

# II

# FRUITS, VEGETABLES, AND BEVERAGES

Occupations in Fruit, Vegetables and Beverage Industry

Fruit and Vegetable Varieties

Fruit and Vegetable Harvesting and Pre-Processing

Fruit and Vegetable Post-Harvesting Practices

Packaging and Marketing of Fruits and Vegetables

# OCCUPATIONS IN THE FRUIT, VEGETABLE, AND BEVERAGE INDUSTRY
## UNIT I

## UNIT OBJECTIVE

Modern methods of processing, distribution, packaging, and marketing of fruits, vegetables, and beverage have created a number of occupations. This unit will discuss some of the occupations available in this industry.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Compile a list of occupations associated with the fruit, vegetable, and beverage industry and give a job description of each.
2. When given an application for employment at a fruit, vegetable, or beverage firm, satisfactorily complete the form.
3. When on a field trip to a fruit, vegetable, or beverage processing plant, identify the types of occupations observed.

# OCCUPATIONS IN THE FRUIT, VEGETABLE, AND BEVERAGE INDUSTRY
## UNIT I

## INSTRUCTIONAL AREAS

1. Identify several occupations associated with fruit processing.
   a. Fruit produce buyer.
   b. Fruit inspection employee.
   c. Fruit shipping clerk.
   d. Etc.
2. Identify several occupations associated with vegetable processing.
   a. Vegetable produce buyer.
   b. Cannery plant employee.
   c. Vegetable products shopper.
   d. Vegetable inspector.
   e. Etc.
3. Identify several occupations associated with the beverage industry.
   a. Fruit juice manufacturer.
   b. Vegetable juice manufacturer.

## METHODS OF EVALUATION

1. Given a list of occupational titles in the fruit processing industry, the student must match the job titles with the job descriptions.
2. Given a list of occupational titles in the vegetable industry, the student must match the job titles with the job descriptions.
3. Given a list of occupational titles in the beverage industry, the student must match the job titles with the job descriptions.
4. After each field trip, the student must compile a list of the different job performances he observed.

5. Each student must submit to the teacher an adequately completed application for employment to each of the fruit, vegetable, and beverage processing firms visited.
This will aid the student in analyzing the different occupations observed as well as knowing the proper procedures for completing an employment application.

## INSTRUCTIONAL AIDS

1. Employment in Agricultural and Agribusiness Occupations--Region 3, Economic Research Service, USDA, Washington, DC, September 1974.

2. Hoover, Norman K., Handbook of Agricultural Occupations, The Interstate Printers and Publishers, Inc., Danville, IL, 1969.

3. Lewis, Wiley B., Review and Analysis of Curricula for Occupations in Food Processing and Distribution, Information Series No. 32, Clearinghouse on Vocational and Technical Education, The Ohio State University, Columbus, OH, December 1970.

4. Occupational Outlook Handbook, U.S. Department of Labor, Washington, DC, 1975-1976.

5. Various sample job application forms from fruit, vegetable, and beverage employers.

# FRUIT AND VEGETABLE VARIETIES
## UNIT II

## UNIT OBJECTIVE

The fruit and vegetable processor must appreciate the substantial differences that varieties of a given fruit or vegetable possess. This unit will acquaint the student with these differences so that he may understand better the products which are being processed.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Distinguish the different varieties of fruits and vegetables when visiting a major fruit and vegetable wholesale facility.
2. When given a selection of vegetables, classify them according to whether they are earth vegetables, herbage vegetables, or fruit vegetables.
3. When given a selection of fruit, determine its maturity and ripeness.
4. Botanically distinguish a fruit from a vegetable.

# FRUIT AND VEGETABLE VARIETIES
## UNIT II

## INSTRUCTIONAL AREAS

1. Fruits and vegetables have many similarities.
    a. Composition.
    b. Methods of cultivation.
    c. Harvesting.
    d. Storage properties.
    e. Processing.
2. Botanically, fruits are those portions of the plant which house seed.
3. An important distinction between fruits and vegetables is made on a usage basis:
    a. Those eaten with main course of a meal.
    b. Those eaten as a dessert.
4. Vegetable varieties are important:
    a. Size.
    b. Shape.
    c. Time of maturity.
    d. Resistance to physical damage.
5. Structural features.
    a. Parenchyma cells differ:
        (1) Size.
        (2) Shape.
    b. Essentially each have some fundamental structure.
6. Turgor and texture ranges encountered in fresh and cooked fruits and vegetables are great.

7. Sources of color and color changes.
    a. Pigments are classified into four major groups:
        1. Chlorophylls.
        2. Carotenoids.
        3. Anthocyanine.
        4. Anthoxanthins.
    b. Pigments belonging to the two latter groups are known as flavonoids.
8. There is great diversity in the kinds of fruits:
    a. 1,000 varieties of apples.
    b. 3,000 varieties of pears.
9. Some fruits are marketed fresh, but more are processed.
10. Fruit quality goes back to tree stock, growing practices, and weather conditions.
11. There is a distinction between maturity and ripeness.
    a. Maturity is the condition when the fruit is ready to eat.
    b. Ripeness is when color, flavor, and texture are at their peak.

## METHODS OF EVALUATION

1. Given a selection of 25 fruits and vegetables, each student should be able to identify each.
2. Each student should be able to classify the following vegetables:
    a. Tomatoes.
    b. Potatoes.
    c. Carrots.
    d. Lima beans.
    e. Watermelon.
    f. Lettuce.
3. Each student should be able to identify the maturity and ripeness of 10 different fruits.

4. A list of the major fruits and vegetables processed in the area is to be submitted by each class member.

## INSTRUCTIONAL AIDS

1. Knapp, H. B. and Auchter, E. C., Growing Tree and Small Fruits, John Wiley and Son, NY. 1941.
2. Potter, Norman N., "Vegetables, Fruits, and Juices," Food Science, AVI Publishing Co., Inc., Westport, CT, 1973.
3. Ware, George W. and McCollum, J.P., Raising Vegetables, The Interstate Printers and Publishers, Inc., Danville, IL, 1962.

# FRUIT AND VEGETABLE HARVESTING
# AND PRE-PROCESSING
## UNIT IV

## UNIT OBJECTIVE

Fruit and vegetable harvesting is a critical period when extreme care must be taken to avoid injury to the crop. The proper time of harvesting, the method of harvesting, and the care of the product before it is processed are of extreme importance.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to·

1. Using the facilities of the classroom or local food store, manually make proper selection of fruits and vegetables.

2. While viewing different harvesting methods in the field, become acquainted with the mechanical harvesting and sorting of fruits and vegetables.

# FRUIT AND VEGETABLE HARVESTING
# AND PRE-PROCESSING
## UNIT IV

## INSTRUCTIONAL AREAS

1. When fruits and vegetables are maturing, they change from day to day.

2. There is a time when a vegetable will be at peak quality from the standpoint of:

   a. Color.

   b. Texture.

   c. Flavor.

3. After a vegetable is harvested, it may quickly pass beyond peak quality condition.

4. The conversion of sugars to starches is the most common occurence when:

   a. Vegetables pass the peak condition of harvest.

   b. Vegetables are harvested and stored improperly.

5. Some sugar is burnt up in respiration.

6. Some vegetables convert sugar to fibrous tissue.

7. The buildup of heat can be a serious problem when vegetables are stockpiled.

   a. Some vegetables give off as much as 120,000 BTU/ton/day.

   b. Heat speeds microorganism growth.

8. Cooling slows down rate of deterioration, it does not prevent it.

9. Proper time to harvest fruit depends upon:

   a. Variety.

   b. Location.

   c. Weather.

   d. Ease of removal from tree.

   e. Purpose to which fruit will be put.

f. Many quality measures can be made before the crop is picked

   1. Compare color of the fruit with standard picture charts.
   2. Measure texture by compression.
   3. Estimate juice solids.
   4. Conduct the acid test.

g. A large amount of harvesting of most fruit crops is done by hand

## METHODS OF EVALUATION

1. The students will grade by hand an assortment of fruits and vegetables with the aid of a produce manager and the instructor.

2. The students will determine by color, texture, and flavor if a fruit or vegetable product is ready for harvest with the aid of an orchardman and the instructor.

3. Given several samples of fruit, the students, with the aid of a color chart, will determine if the product is ready for harvest.

4. The students will record the readings and determine the texture of several samples of fruit.

5. Film--"Behind the Grade Mark -- USDA."

## INSTRUCTIONAL AIDS

1. "Behind the Grade Mark--USDA," Film Library, 31 Roberts Hall, Cornell University, Ithaca, NY.

2. Desrosier, Norman W., The Technology of Food Preservation, AVI Publishing Co., Inc., Westport, CT, 1970.

3. Potter, Norman N., "Vegetables, Fruits, and Juices," Food Science, AVI Publishing Co., Inc., Westport, CT, 1973.

# FRUIT AND VEGETABLE POST-HARVEST PRACTICES
## UNIT IV

## UNIT OBJECTIVE

Before a fruit or vegetable product reaches the consumer, it has been subjected to several post-harvesting operations designed to improve the final processed product.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Using the facilities of the school, conduct a canning experiment with one major fruit or vegetable.
2. Perform the necessary post-harvesting practices in cooperation with the canning experiment:
    a. Washing.
    b. Skin removal.
    c. Cutting and trimming.
    d. Blanching.
    e. Canning.
3. Given a tour of several canning and processing facilities, identify the major machinery used in post-harvesting occupations.

# FRUIT AND VEGETABLE POST-HARVEST PRACTICES
## UNIT IV

## INSTRUCTIONAL AREAS

1. Post-harvesting practices generally include:

    a. Storage of the raw product, usually in a temperature-controlled area.

    b. Washing equipment will generally depend upon the size, shape, and fragility of the product.

        1. Flotational washer used for small vegetables.
        2. In rotary washer, vegetables tumble while being sprayed with jets of water.

    c. Skin removal.

        1. Thin-skinned vegetables are submerged.
        2. Thick-skinned vegetables are put under steam.
        3. Direct flame skin removal.
        4. Rotary tube peelers.

    d. Cutting and trimming done with knives.

    e. Blanching inactivates natural enzymes.

        1. Vegetables blanched at 212°.
        2. Blanching times vary from 1-11 minutes, depending upon product.

    f. Canning.

        1. Boiling water bath used for high acid foods.
        2. Pressure canner used for low acid foods.

    g. Steps in a typical canning operation:

        1. Harvesting.
        2. Receiving raw product.
        3. Washing.
        4. Sorting and grading.
        5. Blanching.
        6. Peeling and coring.
        7. Filling.
        8. Exhausting.
        9. Sealing.
        10. Processing.
        11. Cooling.
        12. Labeling.
        13. Warehousing and packing.

h. Large amounts of high quality fruits are frozen.

i. Freezing is generally superior to canning.

j. Heat blanching is not used for fruits.

k. Syrup sugar minimizes oxidation.

  1. Coats fruit, preventing contact with oxygen.
  2. Protects against loss of volatile fruit flavor.
  3. Contributes sweet taste.

## METHODS OF EVALUATION

1. Given the necessary equipment, each student will can one vegetable or fruit product using one of the two methods discussed.

2. Conduct field trips to two or three different types of food processing facilities.

3. Write an evaluation of the processes used, general working conditions, and activities observed on at least three field trips to processing firms (Ex. 1, 2, 3).

## INSTRUCTIONAL AIDS

1. Desrosier, Norman W., The Technology of Food Preservation, AVI Publishing Co., Inc., Westport, CT, 1970.

2. Kramer, Amihud, Food and the Consumer, AVI Publishing Co., Inc., Westport, CT, 1973.

3. Potter, Norman N., "Vegetables, Fruits and Juices," Food Science, AVI Publishing Co., Inc., Westport, CT, 1973.

4. "Pressure Canning Update," Film Library, 31 Roberts Hall, Cornell University, Ithaca, NY.

5. "Understanding the Science Behind the Preservation of Food," Film Library, 31 Roberts Hall, Cornell University, Ithaca, NY.

# FRUIT AND VEGETABLE POST-HARVEST PRACTICES
## UNIT IV

## EXAMPLE 1

## EVALUATION OF A FRUIT PROCESSING COOPERATIVE AND FRUIT PROCESSING CORPORATION

Problem 1--When analyzing the physical facilities of the two fruit processing facilities, describe how the two are alike and different. (Minimum of 100 words)

Problem 2--If a friend of yours is applying for employment at the two plants, which one would you recommend he choose? (Note: Special consideration should be given to working conditions, incentive programs, etc.)

## EXAMPLE 1

Problem 3--How is the management of the two companies alike and different?

ALIKE

DIFFERENT

# FRUIT AND VEGETABLE POST-HARVEST PRACTICES
## UNIT IV

## EXAMPLE 2

## EVALUATION OF FRUIT AND VEGETABLE PACKING COMPANY

Problem 1--Discuss in detail each of the post-harvesting operations which you viewed with the processing of pumpkins from the time they were unloaded until packaged.

Problem 2--What brand label was used?

Problem 3--How were the seeds from the plant dried, and what were they used for?

Problem 4--Were there any areas within the plant where you would not like to work and why?

# FRUIT AND VEGETABLE POST-HARVEST PRACTICES
## UNIT IV

## EXAMPLE 3

## EVALUATION OF A POTATO CHIP FACTORY

Answer the following questions:

1. Discuss the storage facilities observed with emphasis on temperature, healing time, humidity, and volume.

2. How wide an area does the factory use in obtaining their supply of potatoes?

3. What are sour flies?

4. Discuss the type of peeling system used.

5. In which area of the plant's operations would you like to work? Why?

# PACKAGING AND MARKETING
# OF FRUITS AND VEGETABLES
# UNIT V

## UNIT OBJECTIVE

Today, packaging is an essential part of food processing and preservation. Without effective packaging, modern systems of food distribution would be impossible.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Given a list of the necessary reference materials, trace the development of food packaging in the processing industry.
2. Operate a packaging and labeling machine.
3. Identify the different types of packaging material.
4. Become familiar with the USDA Standards for selected grades of fruits and vegetables which are processed and marketed.
5. Become familiar with the U.S. fresh fruit and vegetable standards.
6. While touring a processing plant, collect samples of packaging material and selected brand name labels.
7. Using the school library facilities and reference room, identify consumer education material available from state and federal agencies.
8. Given selections of apples, potatoes, tomatoes, etc. properly grade each sample according to USDA grade standards.

# PACKAGING AND MARKETING OF FRUITS AND VEGETABLES
## UNIT V

## INSTRUCTIONAL AREAS

1. Packaging is a preservation method.
2. Functions of food containers:
    a. Nontoxic and compatible with the specific food.
    b. Sanitary protection.
    c. Moisture and fat protection.
    d. Gas and odor protection.
    e. Light protection.
    f. Resistance to impact.
    g. Transparency.
    h. Tamperproof.
    i. Ease of opening.
    j. Pouring features.
    k. Reseal features.
    l. Ease of disposal.
    m. Size, shape, weight limitations.
    n. Appearance, ease of printing.
    o. Low cost.
    p. Special features.
3. Two types of containers:
    a. Primary container comes in direct contact with food.
        1 Cans.
        2 Jars.
    b. Secondary container does not come into direct contact with food.
        1. Outer box, case, or wrapper that holds cans or jars.

4. Sanitary protection is protection against introduction of microorganisms as well as dirt.

5. Food should not absorb moisture from the atmosphere, and moist foods should not lose moisture and dry out.

6. Packaging materials.

   a. Metal containers account for about one-third of all primary packages.

      1. Refer to them as tin cans.

   b. Metal cans do have some disadvantages.

      1. If kept for a long time, the tin plating will crystalize.
      2. Seams occasionally weaken.

   c. Glass containers have all the advantages of metal containers except that they are fragile.

   d. Paper and related materials have many advantages for food packaging.

      1. Flexibility.
      2. Low cost.
      3. Ease of decorating and labeling.
      4. Ability to protect food from most external forces.

   e. By laminating paper, its ability to control exchanges of gases and water vapor is improved.

   f. Flexible film packages.

      1. Cellophane.
      2. Polymer.
      3. Metal foil.

7. Food packaging is an indispensable part of processing, distribution, and marketing.

## METHODS OF EVALUATION

1. Using the packaging and labeling facilities of a local processing firm, the student should acquire the basic knowledge necessary to operate a packaging and labeling machine.

2. Submit a collection of various types of packages, packaging material, and labels.

3. Show proficiencey in reading a nutritional label by calculating the total amount of nutrients supplied to a family of four.

4. Properly grade a selection of fruits and vegetables (Ex. 1, 2, 3, 4, 5, 6, 7).

5. Quiz: Grades of apples (Ex. 8).

## INSTRUCTIONAL AIDS

1. Food Facts You Should Know, Cereal Institute, Inc., 135 South La Salle St., Chicago, IL, February 1976.

2. Fresh Fruit and Vegetable Shipments, Agricultural Marketing Service, USDA, Washington, DC.

3. How to Series. . ., Agricultural Marketing Service, USDA, Washington, DC.

   How to Buy Canned and Frozen Fruits.
   How to Buy Canned and Frozen Vegetables.
   How to Buy Dry Beans, Peas, and Lentils.
   How to Buy Fresh Fruits.
   How to Buy Fresh Vegetables.
   How to Buy Potatoes.

4. Kramer, Amihud, "Packaging and Marketing," Food and the Consumer, AVI Publishing Co,, Inc., Westport, CT, 1973.

5. Learn to Use a Label, Bureau of Rural Affairs/Consumer Services Division, Department of Agriculture, Harrisburg, PA.

6. Potter, Norman N., "Food Packaging," Food Science, AVI Publishing Co., Inc., Westport, CT, 1973.

7. See the Facts About the Foods You Eat, Cereal Institute, Inc., 135 South La Salle St., Chicago, IL, November 1975.

8. U.S. Standards. . ., USDA, Agricultural Marketing Service, Washington, DC.

   Apples.
   Apples for Processing.
   Fresh Freestone Peaches for Canning, Freezing, or Pulping.
   Fresh Shelled Lima Beans for Processing.
   Fresh Shelled Peas for Canning or Freezing.
   Fresh Tomatoes.
   Mushrooms for Processing.
   Peaches.
   Pears for Processing.
   Potatoes.
   Potatoes for Processing.

Snap Beans for Processing.
Summer and Fall Peas.
Sweet Cherries.
Sweet Corn for Processing.
Sweet Potatoes for Canning or Freezing.
Sweet Potatoes for Dicing or Pulping.
Tomatoes for Processing.
Winter Pears.

9. Grade Names for Fresh Fruits and Vegetables, Agricultural Marketing Service, USDA, Washington, DC, AMS-569, July 1976.

10. Federal Marketing Orders for Fruits and Vegetables in Brief, Agricultural Marketing Service, USDA, Washington, DC, AMS-563, February 1976.

11. Federal Food Standards, Agricultural Marketing Service, USDA, Washington, DC, AMS-548, November 1976.

## PACKAGING AND MARKETING OF FRUITS AND VEGETABLES
## UNIT V

### EXAMPLE 1

### APPLES
For Fresh Market

| U.S. Extra Fancy | U.S. Fancy | U.S. No. 1 | U.S. Utility |
|---|---|---|---|
| Must be: | Must be: | Must be: | Must be: |
| Mature | Mature | Mature | Mature--not overripe |
| Hand picked | Hand picked | Hand picked | Not seriously damaged |
| Clean | Clean | Clean | Hand picked |
| Well formed | Well formed | Well formed | |
| Free from: | Free from: | Free from: | Free from: |
| Decay | Decay | Decay | Decay |
| Injury | Injury | Injury | Skin damage |
| Freezing injury | Freezing injury | Freezing injury | Scald |
| Slight bruises | Slight bruises | Slight bruises | Freezing injury |
| Visible water core | Visible water core | Invisible water core, less color required except yellow, green varieties | Visible water core |

Tolerances

| | | | |
|---|---|---|---|
| 10% - fail to reach grades | 10% - fail to reach grade | 10% - fail to reach grades | 10% - fail to reach grades |
| 5% - seriously damaged | 5% - seriously damaged | 5% - seriously damaged | 5% - seriously damaged |
| 1% - internal breakdown | 1% - internal breakdown | 1% - internal breakdown | 1% - internal breakdown |

# PACKAGING AND MARKETING
# OF FRUITS AND VEGETABLES
## UNIT V

## EXAMPLE 2

### APPLES
### For Processing

| U.S. No. 1 | U.S. No. 2 | U.S. Cider | Culls |
|---|---|---|---|
| Free from:<br>Overripeness<br>Decay<br>Wormholes<br>Freezing injury<br>Internal breakdown<br>defect or combination of defects and not more than 5% less when apple is prepared for commercial use. | Free from:<br>Overripeness<br>Decay<br>Wormholes<br>Freezing injury<br>Internal breakdown<br>Any other defect or combination of defects and not more than 12% less when apple is prepared for commercial use. | Free from:<br>Decay<br>Wormholes<br>Internal breakdown | Apples which do not meet the U.S. cider grade<br>Tolerances:<br>Up to:<br>10%-defects<br>2%-decay<br>2%-internal breakdown<br>5%-wormholes<br>5%-too small<br>10%-too large |

# PACKAGING AND MARKETING OF FRUITS AND VEGETABLES
## UNIT V

## EXAMPLE 3

## APPLE VARIETIES

I. General Appearance

A. Red Delicious
1. 5 stars or crowns
2. Pitted dots

B. Golden Delicious
1. Same as Red Delicious except golden in color

C. Johathan
1. Straw-yellow stripes
2. Small
3. Round cone shape

D. Northern Spy
1. Largest in uniformity
2. Dull skin - will not shine

E. Stayman (Winesap)
1. Round conic shape
2. Shape varies
3. Numerous dots at calyx end

F. Roman Beauty
1. Will shine
2. Dark dots at calyx end

G. Cortland
1. Flat
2. Will not shine
3. Deep calyx
4. Color 1/2 green, 1/2 red

H. Red Rome
1. Many small
2. Soft texture
3. Bruises easily
4. Will not shine

I. Idared
1. Will shine
2. Deepest of all calyx cavities
3. Color 1/2 green, 1/2 red

## EXAMPLE 3

J. Grimes Golden
  1. Shape same as Red Delicious
  2. Darkest (deepest) green of all apples

K. York Imperial
  1. Off-centered
  2. Hard apple

L. Smokehouse
  1. Light green
  2. Rough shine

# PACKAGING AND MARKETING
# OF FRUITS AND VEGETABLES
# UNIT V

## EXAMPLE 4

## CHARACTERISTICS OF APPLES

Form -- Shape

Size -- 3 - 3 1/4 inches

Color -- Brighter red, gold, green

Uniformity -- All same size and shape

Condition -- Defects of apple

# PACKAGING AND MARKETING
# OF FRUITS AND VEGETABLES
# UNIT V

## EXAMPLE 5

## MUSHROOMS FOR PROCESSING

A. U.S. No. 1
   1. Fresh mushroom caps or whole mushrooms
   2. Not soft
   3. Fairly well shaped
   4. Tender
   5. Free from:
      a. Decay
      b. Disease spots
      c. Insects
      d. Damage caused by insects, bruising, discoloration
   6. Each mushroom cap is not less than 1/2 inch in diameter.

B. U.S. No. 2
   1. Fresh mushroom caps, whole mushrooms, useable pieces, and useable portions of the stems of mushrooms
   2. Tender
   3. Free from:
      a. Decay
      b. Insects
      c. Damage caused by insects, disease spots, bruising, discoloration
   4. Each mushroom cap is not less than 1/2 inch in diameter

C. Culls
   1. Whole mushrooms, mushroom caps, pieces and stems of mushrooms which fail to meet the U.S. No. 2 Grade

D. Definitions:
   1. Similar varietal characteristics -- mushrooms are of same general color
   2. Fairly well shaped -- mushroom cap is not flattened, scalloped, indented, or otherwise deformed, which detracts from processing quality
   3. Tender -- flesh of cap and stem is not fibrous, rubbery, or stringy
   4. Soft -- cap is indented or concave, cottony appearance

# PACKAGING AND MARKETING
# OF FRUITS AND VEGETABLES
# UNIT V

## EXAMPLE 6

## POTATOES

Potatoes are purchased through a broker and are monitored as they arrive at the plant for external condition, specific gravity

Factors affecting these three are rainfall, temperature, and farming practices. More rainfall--lower specific gravity.

Potatoes are supplied to us from the southern states, midwest, PA, NY, and ME.

There is no need to store southern potatoes because the supply is ample during the summer.

However, we must store for winter use and for this we use mostly northern PA, NY, ME and midwest stock.

The climate in these areas is more favorable for growing potatoes that will store well.

After a healing period of two weeks at 60°-65°F and relative humidity of 80 to 90 percent, potatoes will be held at around 55° in storage.

Potatoes that have been exposed to temperatures lower than 50° may have a high sugar content and must be conditioned for 4 to 6 weeks to get them ready for chips.

Peeling during the winter or storage season is an abrasive operation; during the harvesting season potatoes are given a vigorous brushing and then processed.

Slicers are set by instrument for thickness and work by centrifugal force. (.006)

Cooking is done with vegetable oil (cottonseed, corn, or peanut) at a temperature of 340°.

Salting is done by gravity at the rate of 1 1/2 to 2 percent.

Foil laminates are used for packaging to retain freshness by blocking light and moisture.

Specific gravity-- taken with hydrometer:

1. 8 lb. potatoes in basket, drop in water, read hydrometer.
2. .065-.070 should be the reading.
3. The higher the reading, the greater the number of chips per potato.
4. 25 lbs. chips/100 lbs. potatoes.

# PACKAGING AND MARKETING
# OF FRUITS AND VEGETABLES
## UNIT V

## EXAMPLE 7

## U.S. GRADES FOR POTATOES

| U.S. Extra No. 1 | U.S. No. 1 | U.S. Commercial | U.S No. 2 |
|---|---|---|---|
| 1. Firm<br>2. Clean<br>3. Fairly well matured<br>4. Fairly well shaped<br>5. Free from:<br>a. Freezing injury<br>b. Blackheart<br>c. Late blight, Southern bacterial wilt, ring rot<br>6. Free from injury caused by:<br>a. Sprouts<br>b. Internal defects<br>7. Size--not less than 2 1/4" dia. or 5 oz. | 1. Firm<br>2. Clean<br>3. Fairly well matured<br>4. Free from:<br>a. Freezing<br>b. Blackheart<br>c. Late blight, Southern bacterial wilt, ring rot<br>5. Size--not less than 1 7/8" in diameter | Meet requirements of U.S. No. 1 grade except for the following:<br>1. Free from serious damage caused by:<br>a. Dirt or other foreign matter<br>b. Russet scab<br>c. Rhizoctonia | 1. Not seriously misshappen<br>2. Free from:<br>a. Freezing injury<br>b. Blackheart<br>c. Late blight, Southern bacterial wilt, ring rot<br>3. Size--not less than 1 1/2" in diameter |

## PACKAGING AND MARKETING OF FRUITS AND VEGETABLES
## UNIT V

### EXAMPLE 8

1. Directions: Match the grades in column A with the appropriate description in column B.

| A | B |
|---|---|
| A. Grades of apples for fresh market | _____U.S. No. 1 |
| B. Grades of apples used for processing | _____U.S. Fancy |
| | _____Culls |
| | _____U.S. No. 2 |
| | _____U.S. Extra Fancy |
| | _____U.S. No. 1 |
| | _____U.S. Utility |
| | _____U.S. Cider |
| | _____U.S. Combination |

2. What is the restriction covering the use of U.S. Combination?

# III

# MEATS, POULTRY, AND EGGS

Man and Meat

Occupations in Meat, Poultry, and Eggs Industry

Meat and Poultry Inspection

Hog Slaughter

Cattle Slaughter

Lamb Slaughter

Veal and Calf Slaughter

Dressing Poultry

Sausages

Preservation and Storage of Meat

Meat, Poultry, and Eggs Evaluation (Judging)

# MAN AND MEAT
## UNIT I

## UNIT OBJECTIVE

The consumption of large quantities of animal products generally is well correlated with the affluence of a society.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. With the data available, assess the per capita consumption of red meat in the U.S., Russia, England, Germany, Uruguay, and Israel.
2. Identify countries which are high consumers of cattle and sheep.
3. Assess from material available what part of the food dollar goes toward the purchase of meats.
4. Given a cut of meat, identify fat tissue and determine the marbling content.
5. Summarize why fats are important in meats.
6. Using data available, determine what were the six main foods Americans ate during a given year.
7. Define the following terms and indicate why they are important with reference to meat:
    a. Protein.
    b. Fat.
    c. Moisture.
    d. Ash.
8. Define marbling.
9. State the importance of the Wholesome Meat Act of 1967.
10. Given a series of consumer questions about meat, prepare a TV program or news article on one or two topics.

# MAN AND MEAT
## UNIT I

## INSTRUCTIONAL AREAS

1. Liberal meat supply has always been associated with a prosperous people.
2. Statistics show that per capita meat consumption decreases with density of population.
3. Inhabitants consume food that is abundant in their area.
    a. Easier to get.
    b. Cheaper.
4. Argentina and Uruguay are the world's heaviest consumers of beef.
5. Australia and New Zealand are the world's heaviest consumers of sheep.
    a. Consume 30 times more lamb and mutton than U.S.
    b. U.S. consumes twice as much pork as New Zealand.
6. The peoples of the world as a whole are always hungry.
7. Our eating habits are governed by:
    a. Income.
    b. Concern for personal well-being.
    c. Ethnic and family traditions.
8. Thirty percent of family food dollar goes for meat purchases.
9. Income governs selection of meat cuts.
    a. Middle income families are heavy meat and potato consumers.
10. U.S. meat industry is nation's largest food industry.
    a. Meat packing ranks 40th out of 40 U.S. industries in return per dollar of sales.
    b. Meat returns 0.8 cents per dollar.
11. Trend for consumers continues to be for leaner meats.

12. Fats are important:
    a. Source of energy.
    b. Carriers of Vitamins A, D, E, K.
    c. Protection.
    d. Regulate body temperature.
13. Marbling:
    a. Fat within the muscle.
    b. Becoming less important in palatability.
    c. Gives meat:
        1. Aroma.
        2. Flavor.
        3. Juiciness.
14. Meat is a natural food.
    a. Lean muscle composed of:
        1. 20 percent protein.
        2. 9 percent fat.
        3. 70 percent moisture.
        4. 1 percent ash.
    b. Edible portion of meat with 1/4" fat covering includes:
        1. 17 percent protein.
        2. 20 percent fat.
        3. 62 percent moisture.
        4. 1 percent ash.
    c. Meat is number one food for man.
        1. Low fiber content.
        2. Ability to be readily absorbed.
        3. Leaves little residue in intestines.
15. Contains all necessary minerals except calcium.
16. Palatable food.
17. Wholesome Meat Act of 1967:
    a. Made all state inspection systems equal to Federal inspection system.

b. Three greatest offenders in food poisoning:

1. Filth
2. Fingers
3. Flies

## METHODS OF EVALUATION

1. Have the students assess the per capita meat consumption of selected countries (Ex. 1).

2. Quiz on the material covered (Ex. 2).

3. Using various cuts of meats, the student must be able to identify marbling content and determine amount of fat covering.

4. Given a selection of tools used in the meat industry, identify the tool, demonstrate its proper use, and show how to sharpen the knives properly.

5. Prepare a report from the information sheet Consumer Questions About Meat.

## INSTRUCTIONAL AIDS

1. "Consumer Questions About Meat," Cooperative Extension Service, The Pennsylvania State University, University Park, PA 1974.

2. Romans, John R., and Zeigler, P. Thomas, The Meat We Eat, The Interstate Printers and Publishers, Inc., Danville, IL, 1974, Chapters 1 and 2.

3. Knives, hone, and steel.

# MAN AND MEAT
## UNIT I

## EXAMPLE 1

Table 1.1. Per Capita Consumption of Red Meat

| Country | Total Meat Lbs. | Beef & Veal Lbs. | Pork Lbs. | Mutton, Lamb, Goat Meat Lbs. |
|---|---|---|---|---|
| 1. U. S. | | | | |
| 2. Russia | | | | |
| 3. England | | | | |
| 4. Uruguay | | | | |
| 5. Germany | | | | |
| 6. Israel | | | | |

# MAN AND MEAT
# UNIT I

## EXAMPLE 2

### Quiz

1. What two countries are the largest consumers of beef?

2. What percentage of a family's food dollar goes for meat?

3. Why are fats important?

   a.

   b.

   c.

4. Define Marbling.

5. What mineral cannot be supplied to the body by meat?

# OCCUPATIONS IN THE MEAT, POULTRY, AND EGG INDUSTRY
## UNIT II

## UNIT OBJECTIVE

Modern methods of processing, distributing, and packaging of meat, poultry, and eggs have created a number of occupations. This unit will present some of the occupations available in these industries.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Compile a list of occupations associated with the meat, poultry, and egg industry and give a job description of each.
2. When given an application for employment at a meat, poultry, or egg processing firm, he or she can satisfactorily complete the application.
3. When on a field trip to a meat, poultry, or egg processing plant, identify the types of occupations observe.

# OCCUPATIONS IN THE MEAT, POULTRY AND EGG INDUSTRY
## UNIT II

## INSTRUCTIONAL AREAS

1. Identify several occupations associated with meat processing:
    a. Meat grader.
    b. Butcher.
    c. Meat inspector.
    d. Etc.
2. Identify several occupations associated with poultry processing:
    a. Poultry inspector.
    b. Quality control technician.
    c. Processing line employee.
    d. Etc.
3. Identify several occupations associated with the egg industry:
    a. Egg grader.
    b. USDA inspector.
    c. Egg candler.
    d. Etc.

## METHODS OF EVALUATION

1. Given a list of occupational titles in the meat processing industry, the student must match the job titles with the job description.

2. Given a list of occupational titles in the poultry processing industry, the student must match the job titles with the job descriptions.

3. Given a list of occupational titles in the egg processing industry, the student must match the job titles with the job descriptions.

4. After each field trip, the student must compile a list of as many different job performances as he observed.

5. Each student must submit to the teacher a satisfactory application for employment to each of the meat, poultry and egg processing firms visited. This will aid the student in analyzing the different occupations observed as well as learning the proper procedures for completing an employment application.

## INSTRUCTIONAL AIDS

1. Employment in Agricultural and Agribusiness Occupations--Region 3, Economic Research Service, USDA, Washington, DC, September 1974.
2. Hoover, Norman K., Handbook of Agricultural Occupations, The Interstate Printers and Publishers, Inc., Danville, IL, 1969.
3. Lewis, Wiley B., Review and Analysis of Curricula for Occupations in Food Processing and Distribution, Information Series No. 32, Clearinghouse on Vocational and Technical Education, The Ohio State University, Columbus, OH, December 1970.
4. Occupational Outlook Handbook, U.S. Department of Labor, Washington, DC, 1975-76.
5. Various sample job application forms from meat, poultry, and egg employers.

## MEAT AND POULTRY INSPECTION
## UNIT III

### UNIT OBJECTIVE

The wholesomeness of America's meat, poultry, and egg supply is protected by the USDA.

### PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Given samples of selected wholesale meat cuts, grade each for meat quality and yield.

2. Working with a local USDA inspector, inspect four meat carcasses for wholesomeness.

3. Given the necessary information, identify the eight meat quality grades:

    a. USDA Prime

    b. USDA Choice

    c. USDA Good

    d. USDA Standard

    e. USDA Commercial

    f. USDA Utility

    g. USDA Cutter

    h. USDA Canner

4. Given the necessary information, identify the meat-yield grades:

    a. Yield Grade 1

    b. Yield Grade 2

    c. Yield Grade 3

    d. Yield Grade 4

    e. Yield Grade 5

5. Summarize how the new beef grading standards will affect the consumer.

6. With materials available, summarize the history of the federal and state meat inspection program.

# MEAT AND POULTRY INSPECTION
## UNIT III

## INSTRUCTIONAL AREAS

1. Inspection of products produced by plants selling across state lines or to other countries.
2. Plants which do not meet Federal inspection programs.
3. Review of foreign inspection systems.
4. Areas checked:
    a. Plant facilities and equipment.
    b. Sanitation.
    c. Slaughter and processing methods.
    d. Containers.
    e. Labeling.
5. Requirements which must be adequate in all Federal plants:
    a. Ante- and post-mortem inspection.
    b. Reinspection.
    c. Sanitation.
    d. Potable water.
    e. Sewage and waste disposal control.
    f. Pest control.
    g. Condemned and inedible material control.
6. Cost of meat inspection:
    a. 1947:
        1. Inspection costs charged to packers and processors.
    b. Kem bill, 1948:
        1. Costs of inspection borne by USDA.
7. Kosher stamp and killing.

8. Anyone doing slaughtering should recognize unhealthy or unthrifty animals.
    a. Animals should not be slaughtered during advanced stages of pregnancy.
    b. Accidental death.
    c. Trichina larva found within the muscle.
    d. Death which results from Swine Stress Syndrome.
        1. Management procedures.
        2. Handling and crowding.
        3. Transportation.
        4. Sudden environmental change.
9. USDA grades for beef, lamb, mutton, veal:
    a. USDA Prime.
        1. Lean is highly marbled.
        2. Usually very tender.
        3. Outside fat may be excessive.
    b. USDA Choice.
        1. Lean is moderately marbled.
        2. Generally tender.
        3. Amount of outside fat is variable.
    c. USDA Good.
        1. Lean contains some marbling.
        2. Tenderness more variable.
        3. Outside fat may be limited.
    d. USDA Standard.
        1. Lean contains little or no marbling.
        2. Tenderness is quite variable.
        3. Very little outside fat.
    e. USDA Commercial.
        1. Comes from older animals.
        2. Lacks tenderness.
        3. Outside fat variable.
    f. USDA Utility.
        1. Very little marbling.
        2. Lacks tenderness.

3. Very little outside fat.
4. Used largely for processing.

g. USDA Cutter.

h. USDA Canner.

10. Yield grades of beef, lamb, mutton, veal, and calf:

   a. Yield grade 1.

      1. Carcass will yield 79.8 percent or more in retail cuts.

   b. Yield grade 2.

      1. 75.2 to 79.7 percent.

   c. Yield grade 3.

      1. 70.6 to 75.1 percent.

   d. Yield Grade 4.

      1. 66 to 70.5 percent.

   e. Yield grade 5.

      1. 65.9 percent or less.

11. USDA grades for pork:

   a. U.S. No. 1.

      1. High quality of lean.
      2. High yield of lean cuts.
      3. Low yield of fat cuts.

   b. U.S. No. 2.

      1. Acceptable quality of lean.
      2. Slightly high yield of lean cuts.
      3. Slightly low yield of fat cuts.

   c. U.S. No. 3.

      1. Acceptable quality of lean.
      2. Slightly low yield of lean cuts.
      3. Slightly high yield of fat cuts.

- d. U.S. No. 4
    1. Acceptable quality of lean.
    2. Lower expected yield of lean cuts.
- e. U.S. Utility.
    1. Lesser development than previous grades.
    2. Do not have acceptable belly thickness.
    3. All carcasses which are soft and oily.

12. Grades of poultry.
    - a. U.S. Grade A.
        1. Free of deformities that detract from appearance.
    - b. U.S. Grade B.
        1. Carcass or part may have moderate deformities.
        2. Misshapen legs or wings.
    - c. U.S. Grade C.
        1. A part does not meet requirements for A or B.
        2. A carcass which does not meet requirements for A or B quality .
13. Egg Grades.
    - a. Classifying by weight.
    - b. Classifying by shell factors.
    - c. Classifying by air cell depth.
    - d. Classification of individual eggs.
14. Film--"The Quality of the Meat You Buy."
15. Film--"Mark of Quality #1."
16. Film--"That the Best Will Be Ours."

## METHODS OF EVALUATION

1. Using carcasses of beef, pork, and lamb, the students should be able to grade each carcass.
2. Given four beef carcasses, each student will determine the yield grade for each carcass.

3. Given a selection of dressed poultry, each student will determine the grade of each carcass.

4. Using USDA grading material, each student should know the current grading system for meats, poultry, and eggs.

5. Review questions on inspection and grading (Ex. 1).

6. Quiz on meat inspection (Ex. 2).

7. Test: Grades of Meat (Ex. 3).

## INSTRUCTIONAL AIDS

1. Beef and Pork Quality, Special Circular 187, Cooperative Extension Service, The Pennsylvania State University, University Park, PA 1974.

2. Beef Breeding: What It Is; How It's Changed, National Livestock and Meat Board, 36 S. Wabash Ave., Chicago, IL, 1976.

3. Consumer Meat Buyer's Guide, Bureau of Rural Affairs, Consumer Service Division, Department of Agriculture, Harrisburg, PA.

4. Egg Grading Manual, Agriculture Handbook No. 75, USDA Consumer and Marketing Service, Washington, DC, August 1975.

5. How the New Beef Grading Standards Will Affect You As a Consumer, Fact Sheet, National Livestock and Meat Board, 36 S. Wabash Ave., Chicago, IL, 1976.

6. Livestock, Meats, Prepared Meats, and Meat Products (Grading, Certification, and Standards), Agricultural Marketing Service, Washington, DC, March 1975.

7. "Mark of Quality #1," Film Library, 31 Roberts Hall, Cornell University, Ithaca, NY.

8. Meat-Quality Grades for the Consumer, Special Circular 193, Cooperative Extension Service, The Pennsylvania State University, University Park, PA 1974.

9. Meat-Yield Grades for the Consumer, Special Circular 194, Cooperative Extension Service, The Pennsylvania State University, University Park, PA, 1974

10. Official USDA Standards. . ., Agricultural Marketing Service, Washington, DC

    Grades of Slaughter Lambs, Yearlings, and Sheep
    Grades of Veal and Calf Carcasses
    Grades of Carcass Beef

11. Poultry Grading Manual, Agriculture Handbook No. 31, USDA Consumer and Marketing Service, Washington, DC, May 1971.

12. Romans, John R. and Zeigler, P. Thomas, The Meat We Eat, The Interstate Printers and Publishers, Inc., Danville, IL, 1974.

13. "That the Best Will Be Ours," Film Library, 31 Roberts Hall, Cornell University, Ithaca, NY.

14. "The Quality of the Meat You Buy," Cooperative Extension Service, Agricultural Editor's Office, University of Delaware, Newark, DE.

15. USDA's Beef Carcass Evaluation Service, USDA Consumer and Marketing Service, Washington, DC, August 1966.

16. USDA Grades for Pork Carcasses, Marketing Bulletin No. 49, Agricultural Marketing Service, Washington, DC, April 1970.

17. USDA Yield Grades for Beef, Marketing Bulletin No. 45, USDA Consumer and Marketing Service, Washington, DC, May 1974.

18. USDA Yield Grades for Lambs, Marketing Bulletin No. 52, USDA Consumer and Marketing Service, Washington, DC, July 1970.

19. USDA Beef Grades, Agricultural Marketing Service, USDA, Washington, DC, May 1976.

20. USDA Grades for Slaughter Swine and Feeder Pigs, Marketing Bulletin No. 51, Agricultural Marketing Service, Washington, DC, July 1974.

21. Lessons on Meat, National Livestock and Meat Board, 36 S. Wabash Ave., Chicago, IL, 1970.

## MEAT AND POULTRY INSPECTION
## UNIT III

### EXAMPLE 1

### Review Questions on Inspection and Grading

1. What is meat quality?

2. Define meat inspection.

3. Draw a federal meat inspection stamp and indicate what it means.

4. Define grading.

5. Draw a federal grading stamp.

6. What is the difference between inspection and grading?

7. What are some factors that determine meat quality?

8. Describe the following meat grades:

   a. USDA Prime.

   b. USDA Choice.

   c. USDA Good.

   d. USDA Standard.

   e. USDA Commercial.

   f. USDA Utility.

   g. USDA Cutter.

   h. USDA Canner.

# MEAT AND POULTRY INSPECTION
## UNIT III

## EXAMPLE 2

### Quiz

1. Explain how the costs for meat inspection were influenced by a Congressional Bill passed in 1947 and the Kem Bill passed in 1948.

2. What is Kosher killing and how does it differ from regular processed foods?

3. Explain the Swine Stress Syndrome.

## MEAT AND POULTRY INSPECTION
## UNIT III

### EXAMPLE 3

### Test: Grades of Meat

### PART I: MATCHING

Match the following USDA grades for beef, lamb, mutton, and veal

a. USDA Prime
b. USDA Choice
c. USDA Good
d. USDA Standard
e. USDA Commercial
f. USDA Utility

1. _____Lean contains little or no marbling
2. _____Used largely for processing
3. _____Lean is highly marbled
4. _____Lean contains some marbling
5. _____Comes from older animals
6. _____Lean is moderately marbled

### PART II: IDENTIFICATION

Place a (✓) mark beside the correct grades of pork:

1. _____U.S. No. 1
2. _____Yield Grade 4
3. _____USDA Cutter
4. _____U.S. No. 5
5. _____U.S. Grade A
6. _____USDA Choice
7. _____U.S. No. 4
8. _____U.S. Extra Fancy
9. _____U.S. No. 2
10. _____U.S. No. 3

### PART III: TRUE OR FALSE

1. _____Not all federally graded meats have to be identified for both yield and quality.

## EXAMPLE 3

2. _____Marbling and maturity are the two factors used to evaluate the palatability of beef.

3. _____Most prime and choice beef is produced from cattle 18 to 24 months old.

4. _____Young beef animals are those over 30 months old.

4. _____Grading refers to wholesomeness; inspection refers to quality.

## PART IV: PROBLEMS — SHOW ALL WORK

1. If you buy a 442 lb. USDA Choice Grade beef half with a Yield Grade 2 for 73¢ per lb. hanging weight, determine:

   a. Cost of purchase $__________

   b. Amount of usable beef if percentage yield grade is 77% __________

   c. Actual cost per pound of usable beef __________

2. If, however, the side you purchase is Choice Yield Grade 5 for 73¢ per pound hanging weight, determine:

   a. Cost of purchase $__________

   b. Amount of usable beef if percentage yield grade is 64% __________

   c. Actual cost per pound of usable beef __________

3. Round roast is advertised in the local paper for $1.39 lb. How many pounds can you buy for $8.00?

# HOG SLAUGHTER
## UNIT IV

## UNIT OBJECTIVE

The methods of hog slaughtering have changed over the years due to new government standards. The consumer also has had an influence on hog slaughtering operations.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Using the facilities of a commercial processing company or stockyards, adequately select the proper market classes and grades of slaughter hogs.
2. Using the facilities of a commercial meat processing company, identify the work stations and jobs performed at each station in the processing line.
3. Using the facilities of a commercial meat cutting department or other comparable facility, cut a side of pork and identify the wholesale cuts.
4. Given pork wholesale meat cuts, identify and cut pork into retail cuts.
5. Tour several meat processing facilities and be able to summarize what was viewed.

# HOG SLAUGHTER
## UNIT IV

## INSTRUCTIONAL AREAS

1. Operations in hog slaughtering.
    a. Immobilization.
        1. Mechanical.
        2. Chemical.
        3. Electrical.
    b. Sticking
        1. May be shackled and hoisted to a sticking rail.
        2. Normally done while hog is lying on its side.
        3. Six-inch knife generally used.
    c. Scalding done at 150° F.
    d. Scraping and eviscerating.
        1. Knife.
        2. Flame.
2. Skinning works well where there is a scarcity of labor.
3. Chilling the carcass
    a. Carcass is split through the center of the backbone.
    b. Head is removed.
    c. Chill temperature is 34° F.
    d. The inside temperature of the ham should be 38° F.
4. Wholesale and retail cuts of fresh pork and cured or smoked pork.

## METHODS OF EVALUATION

1. Conduct a field trip to local pork processor.
2. Provide a checklist of hog slaughtering operations (Ex. 2).
3. Have each student do an evaluation of a field trip to a pork processing firm (Ex. 3 and 4).
4. Film--"Hog Slaughter Technique."

5. Have each student do a worksheet on hog slaughtering (Ex. 5).

6. Have each student match the retail cuts with the proper wholesale cuts of pork (Ex. 6).

7. If safety and union regulations permit, have each student cut a side of pork.

8. Slides--"Identification of Cuts of Pork."

## INSTRUCTIONAL AIDS

1. Beef and Pork Quality, Special Circular 187, Cooperative Extension Service, The Pennsylvania State University, University Park, PA 1974.

2. "Cuts of Pork," Transparency, Nasco, Fort Atkinson, WI.

3. "Hog Slaughter Technique," Film Library, 31 Roberts Hall, Cornell University, Ithaca, NY.

4. "Identification of Cuts of Pork," Nasco, Fort Atkinson, WI.

5. "Meat Cuts," Transparency Master, Vocational Education Productions, California Polytechnic College, San Luis Obispo, CA.

6. Meat Identification, Speical Circular 186, Cooperative Extension Service, The Pennsylvania State University, University Park, PA, 1974.

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8. Pork Charts, USDA Consumer and Marketing Service, Washington, DC, 1968.

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## HOG SLAUGHTER
## UNIT IV

### EXAMPLE 1

### Wholesale and Retail Cuts of Pork

Pork — Fresh

| Wholesale Cuts | Retail Cuts |
|---|---|
| Fresh ham (leg) | Fresh ham (leg), butt half<br>Fresh ham (leg), shank half<br>Fresh ham (leg), boneless<br>Fresh ham (leg), center slice |
| Loin | Center loin roast<br>Sirloin roast<br>Blade loin roast<br>Rib chop<br>Loin chop<br>Tenderloin<br>Back ribs |
| Fresh side (belly) | Fresh side pork |
| Spareribs | Spareribs |
| Fresh picnic shoulder | Fresh picnic shoulder<br>Arm roast<br>Arm steak |
| Boston butt | Boston butt<br>Blade steak |

Pork — Cured and Smoked

| | |
|---|---|
| Smoked ham | Ham, butt half<br>Ham, shank half<br>Center ham slice<br>Smoked loin<br>Smoked loin chips |
| Smoked picinic shoulder | Smoked picnic shoulder |
| Smoked shoulder butt | Smoked Boston shoulder |
| Bacon | Slab bacon<br>Sliced bacon<br>Jowl bacon square<br>Canadian-style bacon |
| Salt pork | Salt side<br>Salt fat back |

Variety Meats

| | | | |
|---|---|---|---|
| Heart | Sweetbreads | Fresh pork sausage | Kidney |
| Tongue | Brains | Liver | Feet |

# HOG SLAUGHTER
# UNIT IV

## EXAMPLE 2

### Areas of Processing Plant

Directions: Briefly describe the following activities associated with or observed in the hog slaughtering and processing facility visited.

1. Immobilization –
2. Cut tendons –
3. Insert S hook or gambrel –
4. Hang on rail –
5. Sticking –
6. Scalding –
7. Dehairing –
8. Hoof removal –
9. Final dehairing –
10. Removal and inspection of head –
11. Split breastbone –
12. Split hams –
13. Cut belly –
14. Remove intestines and inspect organs –
15. Remove leaf fat –

EXAMPLE 2

16. Final inspection –

17. Chilling –

18. Halve the carcass –

## EXAMPLE 3

## HOG SLAUGHTER
## UNIT IV

### Evaluation of Hog Slaughting and Processing Facility I

Answer the following:

1. List in order the proper sequence of events showing how the hogs moved through the processing facility.

Operations

a. Hang on rail ________
b. Removal and inspection of head ________
c. Immobilization ________
d. Split breastbone ________
e. Scalding ________
f. Sticking ________
g. Dehairing ________
h. Remove leaf fat ________
i. Chilling ________
j. Singing ________
k. Out tendon ________
l. Hang on gambrel ________
m. Split hams ________
n. Final shaving ________
o. Final inspection ________
p. Halve the carcass ________
q. Polisher ________
r. Split belly ________
s. Remove intestines and inspect organs ________

2. What was the purpose of the dunker in the scalding tanks?

3. What was the purpose of the polisher?

4. The plant management had posted a key word which they encourage their employees to strive for during the year. What was the word for 1977?

5. Rate this plant in the following areas, using these terms: (S-Superior, A-Average, P-Poor)

| | | | |
|---|---|---|---|
| a. Holding area | S | A | P |
| b. Sticking area | S | A | P |
| c. Cleanliness in slaughtering area | S | A | P |

## EXAMPLE 3

| | | | | |
|---|---|---|---|---|
| d. | Efficiency | S | A | P |
| e. | Lighting | S | A | P |
| f. | Ham curing | S | A | P |
| g. | Ease of movement in curing area | S | A | P |
| h. | Safety in curing plant | S | A | P |
| i. | Cleanliness in curing area | S | A | P |
| j. | Worker incentive programs | S | A | P |
| k. | Storage facilities | S | A | P |
| l. | Inspection methods | S | A | P |

6. What area of the tour were you most impressed with and why?

# HOG SLAUGHTER
# UNIT IV

## EXAMPLE 4

### Evaluation of Hog Slaughtering and Processing Facility II

Answer the following:

1. What outstanding feature of processing facility II was in your estimation different from processing facility I?

2. How many people were employed?

3. Name 3 things the employer looks for when hiring an employee.

   a.

   b.

   c.

4. How often were the employees evaluated?

5. What was the advantage of the salary schedule presented?

6. What was the rate of turnover? _______________percent
   _______________number of people

7. What percentage of the hogs processed were locally produced?

8. Why were the hot Dogs put into 26° water?

9. Explain how the smoking machines operated — how was smoke produced?

10. How did the shipping department differ from that of the food distribution center?

11. If you were going to work in any area of the plant, where would it be and why?

EXAMPLE 4

12. What part of the processing line (hog line) impressed you the most?

13. Do you feel that the tour was worthwhile? Did you see what you expected to see?

# HOG SLAUGHTER
## UNIT IV

### EXAMPLE 5

1. The USDA grades for barrows and gilts are:
   a.
   b.
   c.
   d.
   e.

2. Roasting pigs range in weight from ________ to _______pounds.

3. Barrows and gilts from ______ to ______months of age produce the highest quality pork.

4. Slaughter hogs are generally marketed at weights ranging from ______ to ______ pounds.

5. Three methods of immobilization are:
   a.
   b.
   c.

6. The advantages of the three methods listed above are:
   a.
   b.
   c.

7. Explain how to stick a hog properly.

8. The skin represents from ______ to ______ percent of the weight of the live hog.

9. Three styles of dressing pork are common in the U.S. They are:
   a.
   b.
   c.

10. Define the following terms:
    a. Barrow
    b. Gilt
    c. Cracklings
    d. Lard
    e. Leaf fat
    f. Gambrel

## HOG SLAUGHTER
## UNIT IV

### EXAMPLE 6

### Identification of Wholesale and Retail Cuts of Pork

Directions: Match the wholesale cuts of pork in column A with their respective retail cuts in column B.

A

A. Fresh ham (leg)
B. Loin
C. Fresh side (belly)
D. Spareribs
E. Fresh picnic shoulder
F. Boston butt
G. Smoke ham
H. Smoked picnic shoulder
I. Smoked shoulder butt
J. Bacon
K. Salt pork

B

1. _____ Fresh side pork
2. _____ Boston butt
3. _____ Rib chop
4. _____ Ham, butt half
5. _____ Fresh ham, (leg) center slice
6. _____ Fresh ham (leg), boneless
7. _____ Center loin roast
8. _____ Fresh picnic shoulder
9. _____ Spareribs
10. _____ Arm steak
11. _____ Blade steak
12. _____ Smoke loin
13. _____ Smoke picnic shoulder
14. _____ Slab bacon
15. _____ Salt side
16. _____ Ham, shank half
17. _____ Smoked Boston shoulder roll
18. _____ Jowl bacon square
19. _____ Salt fat back
20. _____ Fresh ham (leg) butt half
21. _____ Sirloin roast
22. _____ Tenderloin
23. _____ Arm roast
24. _____ Center ham slice
25. _____ Sliced bacon
26. _____ Fresh ham (leg) shank half
27. _____ Blade loin roast
28. _____ Canadian-style bacon
29. _____ Back ribs
30. _____ Smoked loin chops
31. _____ Loin chop

# CATTLE SLAUGHTER
## UNIT V

## UNIT OBJECTIVE

Accurate identification and proper cutting of wholesale and retail beef meat cuts as well as proper selection and beef cattle slaughtering methods will aid in determining the maximum use of the product.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Using the facilities of a commercial processing company or stockyards, adequately select the proper market classes and grades of slaughter cattle.
2. Using the facilities of a commercial beef processing company, identify the work stations and jobs performed at each station in the processing line.
3. Using the facilities of a commercial meat cutting department or other comparable facility, cut a half of beef and identify the wholesale cuts.
4. Given beef wholesale meat cuts, identify and cut beef into retail cuts.
5. Tour several meat processing facilities and be able to summarize what was viewed.

# CATTLE SLAUGHTER
# UNIT V

## INSTRUCTIONAL AREAS

1. Beef steers (15 to 24 months old) furnish the bulk of the high-grade beef sold in the market.

2. Slaughter cattle includes all market and grades of cattle bought for immediate slaughter.

3. USDA grades for beef

    a. Prime beef.

        1. Lean is highly marbled.
        2. Usually very tender.
        3. Amount of outside fat is variable.
        4. Dressing percentage is from 63 to 66 percent.

    b. Choice beef.

        1. Lean is moderately marbled.
        2. Generally tender.
        3. Amount of outside fat is variable.
        4. Dressing percentage is from 59 to 61 percent.

    c. Good beef.

        1. Lean contains some marbling.
        2. Tenderness more variable.
        3. Outside fat may be limited.
        4. They should dress from 54 to 60 percent.

    d. Standard beef.

        1. Lean contains little or no marbling.
        2. Tenderness is quite variable.
        3. Very little outside fat.
        4. They should dress from 52 to 58 percent.

    e. Commercial beef.

        1. Comes from older animals.
        2. Lacks tenderness.
        3. Outside fat variable.
        4. The yield is from 52 to 56 percent.

    f. Utility beef.

        1. Very little marbling.
        2. Lacks tenderness.
        3. They dress in the low fifties.

g. Cutter and canner beef.

1. Old cattle.
2. Have characteristics of dairy breeds.

4. Beef operations.

a. Cattle should be kept off feed at least 24 hours before slaughtering.

b. Stunning.

1. Usually done with a compression gun.

c. Sticking.

1. Standard method is done over point of the brisket moving toward the jaw .
2. In Kosher method the animal is hoisted without stunning and cut across the throat.

d. Heading is accomplished by cutting through the Adam's apple and the atlas joint.

e. Shanking or legging.

f. Siding.

g. Opening.

h. Rumping.

i. Eviscerating.

j. Backing.

k. Halving.

5. All blood should be washed off both the inside and the outside of the carcass with cold or lukewarm water.

6. Shrouding is sometimes used.

a. Absorb blood.

b. Smooth the external fat covering.

c. Cause the fat to appear white and dense.

7. Ninety percent of the beef slaughtered today is done in Federally inspected plants.

8. Drift is the loss of weight when kept off feed for 24 hours.

9. The weight of the hide varies with the breed of cattle .

10. Edible by-products.
    a. Offal fat.
    b. Heart.
    c. Tongue.
    d. Liver.
    e. Tripe.
11. A thorough chilling is essential during the first 24 hours, otherwise carcass may sour at hip joint.
12. Wholesale and retail cuts of beef (Ex. 1).

## METHODS OF EVALUATION

1. Conduct a field trip to local cattle processor (Ex. 2).
2. Have each student do an evaluation of a field trip to a cattle processing firm.
3. Have each student do a worksheet on cattle slaughter (Ex. 3).
4. Have each student match the retail cuts with the proper wholesale cuts of beef (Ex. 4).
5. Slides--"Identification of Cuts of Beef"
6. If safety and union regulations permit, have each student cut a half of beef.

## INSTRUCTIONAL AIDS

1. Beef and Pork Quality, Special Circular 187, Cooperative Extension Service, The Pennsylvania State University, University Park, PA, 1974.
2. Beef Chart, USDA Consumer and Marketing Service, Washington, DC, 1958.
3. Beef Grading: What It Is; How It's Changed, National Livestock and Meat Board, 36 S. Wabash Avenue, Chicago, IL, 1976.
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6. "Cuts of Beef," Transparency, Nasco, Fort Atkinson, WI.

7. How to Buy Beef Roasts, USDA, Agricultural Marketing Service, Washington, DC, January 1968.

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11. "Meat Cuts," Transparency Master, Vocational Education Productions, California Polytechnic College, San Luis Obispo, CA.

12. Meat Identification, Special Circular 186, Cooperative Extension Service, The Pennsylvania State University, University Park, PA, 1974.

13. Meat Identification Kit, The Interstate Printers and Publishers, Inc., Third Edition, Danville, IL.

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15. Uniform Retail Meat Identity Standards, National Livestock and Meat Board, 36 S. Wabash Avenue, Chicago, IL, 1973.

16. USDA Yield Grades for Beef, Marketing Bulletin No. 52, USDA, Consumer and Marketing Service, Washington, DC, May 1974.

17. USDA Beef Grades, Agricultural Marketing Service, USDA, Washington, DC, May 1976.

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# CATTLE SLAUGHTER
# UNIT V

## EXAMPLE 1

### Wholesale and Retail Cuts of Beef

| Wholesale Cuts | Retail Cuts |
|---|---|
| Round | Round steak |
| | Top round steak |
| | Bottom round steak |
| | Eye round steak |
| | Sirloin tip cap on |
| | Sirloin tip cap off |
| | Heel of round |
| Rump | Standing rump |
| | Rolled rump |
| Sirloin (loin end) | Sirloin steak |
| | Top sirloin butt steak |
| | Boneless sirloin steak |
| Short loin | Porterhouse steak |
| | T-bone steak |
| | Club steak |
| | Top loin steak |
| | Tenderloin steak |
| Flank | Flank steak |
| Rib | Standing rib |
| | Rolled rib |
| | Rib steak |
| Chuck | Arm pot roast |
| | Arm steak |
| | Blade pot roast |
| | Blade steak |
| | English (Boston) cut |
| | Shoulder pot roast cut |
| | Inside chuck pot roast |
| Short plate | Plate (bone in) |
| | Rolled plate |
| | Short rib |
| Brisket | Brisket (bone in) |
| | Boneless fresh brisket |
| Fore shank | Fore shank |
| | Shank cross cuts |
| | Corned beef brisket |

**Variety Meats**

Heart, Tongue, Beef for stew, Ground beef, Liver, Kidney

# CATTLE SLAUGHTER
## UNIT V

## EXAMPLE 2

### Evaluation of Cattle Slaughtering and Processing Facility

Answer the following questions:

1. Describe how the steers were stunned.

2. Which area of the plant were you most impressed with and why?

3. Was the carcass quality graded and yield graded?

4. On the back of this paper sketch the floor layout of the holding and slaughtering areas.

5. If you were going to work in any area of the plant, where would it be and why?

6. Describe in detail the slaughtering process from the time the steers were stunned until they entered the cooling room.

# CATTLE SLAUGHTER
# UNIT V

## EXAMPLE 3

Cattle Slaughtering.

1. Beef steers furnish the bulk of the high-grade beef sold on the market.
2. How old are beef steers?
3. Heifers run slightly lower in dressing yield due mainly to a ________________ amount of internal fat.
4. Most high-grade beef steers and heifers are ____________ fattened.
5. What are slaughter cattle?
6. Normally, prime cattle have ____________________ as a result of long feeding.
7. The prime cattle that do come to market now end up largely in the _____________ and _______________ trade.
8. Define:
    a. USDA yield grade.
    b. Carcass yield.
9. Another term for carcass yield is _____________ percentage.
10. Summarize the following grades and give dressing percentage:
    a. USDA Prime.
    b. USDA Choice.
    c. USDA Good.
    d. USDA Standard.
    e. USDA Utility.

# CATTLE SLAUGHTER
# UNIT V

## EXAMPLE 4

Identification of Wholesale and Retail Cuts of Beef.

Directions: Match the wholesale cuts of beef in column A with their respective retail cuts in column B.

A

A. Round
B. Rump
C. Sirloin (loin end)
D. Short loin
E. Flank
F. Rib
G. Chuck
H. Short plate
I. Brisket
J. Fore shank

B

1.______Flank steak
2.______Standing rump
3.______Sirloin steak
4.______Round steak
5.______Standing rib
6.______Arm steak
7.______Plate (bone in)
8.______Short ribs
9.______Fore shank
10.______Corned beef brisket
11.______Top round steak
12.______Rolled rump
13.______T-bone steak
14.______Rolled rib
15.______Blade steak
16.______Rolled plate
17.______Sirloin tip, cap on
18.______Heel of round
19.______Tenderloin steak
20.______Rib steak
21.______Arm pot roast
22.______Inside chuck pot roast
23.______Eye round steak
24.______Boneless sirloin steak
25.______Porterhouse steak
26.______Top loin steak
27.______Blade pot roast
28.______Shoulder pot roast cut
29.______Boneless fresh brisket
30.______Shank cross cuts
31.______Bottom round steak
32.______Brisket (bone in)
33.______Club steak
34.______Sirloin tip, cap off
35.______English (Boston) cut
36.______Top sirloin butt steak

# LAMB SLAUGHTER
## UNIT VI

## UNIT OBJECTIVE

Sheep and lamb production has long played an important part in the U.S. livestock industry.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Using the facilities of a commercial processing company or stockyards, adequately select the proper market classes and grades of slaughter sheep and lambs.
2. Using the facilities of a commercial meat cutting department or other comparable facility, cut up a lamb or mutton side and identify the wholesale cuts.
3. Given lamb or mutton wholesale cuts, identify and cut into retail cuts.

# LAMB SLAUGHTER
## UNIT VI

## INSTRUCTIONAL AREAS

1. Imports of lamb and mutton have increased during recent years.
   a. Decrease in U.S. production.
   b. Need for Australia and New Zealand to find additional markets.
2. Marketing of sheep at an early age has eliminated much consumer objection to flavor.
3. Lamb is sold primarily in the form of consumer cuts.
4. Mutton is sold largely in soup stock, sausages, and other prepared meats.
5. Hothouse lambs:
   a. Lambs which are housed in barns or sheds to protect them from cold weather.
   b. Dropped during months of October, November, December, and January.
   c. Marketed at weights ranging from 25 to 60 pounds.
6. Hothouse lambs are followed by spring lamb crop.
7. Lambs born during regular spring lambing season and marketed the following winter are chief source of lamb carcass meat.
   a. Yearling is a ewe or wether between 15 and 20 months old.
   b. Mature mutton is all sheep over 20 months of age.
8. USDA grades for lamb:
   a. Prime.
      1. Wide, deep, smooth, and compact conformation.
      2. Thick and neat shoulders.
      3. Broad and thick back.
      4. Plump legs.
      5. Finish must be firm and evenly distributed.
   b. Choice
      1. Slightly less than prime in conformation.
      2. Moderate amount of finish.

c. Good

1. Somewhat deficient in meatiness and finish.
2. Includes a number of animals of the fine wool breeds.
3. Lack of trimming fat.

d. Utility

1. Narrow and rangy.
2. Long legs.
3. High twist.
4. Unsymmetrical conformation.
5. Prominence of bone.

e. Cull

1. Thin.
2. Unsymmetrical.
3. Gaunt.
4. Leggy.
5. Rangy.
6. Narrow.
7. Long necked.

9. Dressing Lambs.

a. Never lift a sheep by grasping the fleece.

1. Causes surface bruise.
2. Grasp sheep by leg when catching it.

b. Well-ground skinning knife is best adapted for pelting.

c. Stunning and sticking.

1. Sharp blow on top of poll.
2. Compression stunner.
3. Captive bolt.
4. Sticking is started behind the jaw.

d. Pelting (fisting).

e. Eviscerating.

10. The pelt is rubbed with fine salt to preserve it.

11. Wool is the chief by-product and ranges from two to eight pounds per head.

12. Yield.

a. Yearlings will dress from 55 to 61 percent.

b. Fat show lamb 2 to 3 percent lower.

c. Choice averages 52 percent.
    1. Mutton type averages 48 percent.
    2. Fine wool breeds average 40 percent.

13. Lamb is the most easily digested of the commercial meats.

14. There is less religious prejudice against lamb and mutton than any other meat except fish.

15. Wholesale and retail cuts of lamb (Ex. 1).

## METHODS OF EVALUATION

1. Conduct a field trip to a lamb slaughtering facility.
2. Film--"Lamb Slaughtering."
3. Slides--"Cuts of Lamb."
4. Have each student do worksheet on lamb slaughter.
5. Have each student match the retail cuts with the proper wholesale cuts of lamb. (Ex. 2).
6. If safety and union regulations permit, have each student cut up a side of lamb.

## INSTRUCTIONAL AIDS

1. How to Buy Lamb, USDA, Agricultural Marketing Service, Washington, DC, 1971.
2. "Identification of Cuts of Lamb," Nasco, Fort Atkinson, WI.
3. "Lamb Slaughtering," Film Library, 31 Roberts Hall, Cornell University, Ithaca, NY.
4. "Meat Cuts," Transparency Master, Vocational Education Productions, California Polytechnic College, San Luis Obispo, CA.
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# LAMB SLAUGHTER
## UNIT VI

### EXAMPLE 1

Wholesale and Retail Cuts of Lamb.

| Wholesale Cuts | Retail Cuts |
|---|---|
| Leg | French leg<br>American leg<br>Leg, steak<br>Lamb leg, sirloin half<br>Sirloin chop |
| Loin | Loin roast<br>Loin chop |
| Rack | Rib roast<br>Rib chop |
| Shoulder | Square-cut shoulder<br>Rolled shoulder<br>Arm chop<br>Blade chop |
| Breast | Breast<br>Riblets |
| Fore shank | Shank |

**Variety Meats**

Lamb patties, Liver, Kidney

## LAMB SLAUGHTER
## UNIT VI

### EXAMPLE 2

### Identification of Wholesale and Retail Cuts of Lamb and Lamb Slaughter

PART I: Match the wholesale cuts of lamb in column A with their respective retail cuts in column B.

A

A. Shoulder
B. Fore shank
C. Loin
D. Breast
E. Leg
F. Rack

B

1. ______Riblets
2. ______Blade chop
3. ______French leg
4. ______Sirloin chop
5. ______Shank
6. ______Arm chop
7. ______Leg, steak
8. ______Rolled shoulder
9. ______American leg
10. ______Loin roast
11. ______Breast
12. ______Rib roast
13. ______Lamb leg, sirloin half
14. ______Square-cut shoulder
15. ______Rib chop
16. ______Loin chop

PART II:

1. Define:

   a. Hothouse lambs –

   b. Ewe –

   c. Wether –

   d. Yearling –

   e. Mutton –

2. What are the grades of lamb?

   a.

   b.

## EXAMPLE 2

c.

d.

e.

3. At what age are all sheep classified as mature mutton?

4. During what months are hothouse lambs born?

5. What is the chief by-product of sheep?

6. What two countries have the largest sheep production?

# VEAL AND CALF SLAUGHTER
## UNIT VII

## UNIT OBJECTIVE

Accurate identification and proper cutting of wholesale and retail cuts of veal and the distinction between vealers and calves will aid the consumer in purchases of these products.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Distinguish between a vealer and a calf.
2. Using the facilities of a commercial processing company or stockyards, adequately select the proper market classes of slaughter calves.
3. Using the facilities of a commercial processing company or stockyards, adequately select the proper market weights and grades of vealers.
4. Using the facilities of a commercial meat cutting department or other comparable facility, cut up a vealer and identify the wholesale cuts.
5. Given wholesale veal cuts, identify and cut into retail cuts.

# VEAL AND CALF SLAUGHTER
## UNIT VII

## INSTRUCTIONAL AREAS

1. Vealer:
    a. Immature animal.
        1. Not over three months old.
        2. Subsisted largely on milk or milk replacer.

    b. Lean is light, grayish pink.
2. Calf:
    a. Immature animal.
        1. Between three and eight months old.
        2. Subsisted in part or entirely on feeds other than milk.

    b. Calf carcass lean is grayish red.
3. Vealers are sold on the market for slaughter purposes only.
4. Greatest supply comes during spring and fall months.
5. Market weights and USDA grades of vealers.
    a. Prime.
        1. Usually crossbred or high grade of beef type.
        2. Smooth, deep, thick, and compact.
        3. Four to eight weeks old.
        4. Weight between 140 and 190 pounds.
        5. Dress from 62 to 67 percent.

    b. Choice.
        1. Similar to prime except for finish.
        2. Usually younger than prime veal.
        3. Weight from 110 to 140 pounds.
        4. Dress around 60 percent.

    c. Good.
        1. Carry less finish.
        2. Show more bone and less uniformity.
        3. Three to six weeks old.
        4. Weight 110 to 120 pounds.
        5. Dress from 55 to 60 percent.

d. Standard.

1. Largely of dairy type.
2. Lack finish.
3. Leggy and hippy.
4. Weight 90 to 110 pounds.
5. Dress 50 percent to 55 percent.

e. Utility.

1. Thin, rangy, and angular.
2. Weight 90 to 180 pounds.
3. May be fine boned and small or large boned and coarse.
4. Dress 50 percent.

f. Cutter.

g. Canner.

6. USDA grades for slaughter calves:

a. The market classifies calves according to sex.

b. Choice and good grades.

1. Varying degrees of beef breeding.
2. Usually high grade or crossbred calves.
3. Generally resold as stocker or feeder calves.

c. Standard and utility grades.

1. Deficient in conformation, finish, and quality.
2. Show dairy or scrub breeding.

7. Methods of dressing veal:

a. Dressed with the skin off or skin on.

b. Handling, stunning, and sticking:

1. Should be kept off feed for 18 hours before slaughter.
2. Any mechanical stunners can be used.
3. Can be either kosher stuck or stuck in front of the brisket.
4. They should be hoisted before sticking.

c. Dressing:

1. Skin off--same as in beef.
2. Skin on--same as in pork.

8. Wholesale and retail cuts of veal (Ex. 1).

## METHODS OF EVALUATION

1. Conduct a field trip to a veal and calf slaughtering facility.
2. Have each student do a worksheet on veal and calf slaughtering (Ex. 2).
3. Slides--"Identification of Cuts of Veal."
4. Have each student match retail cuts of veal with wholesale cuts of veal.

## INSTRUCTIONAL AIDS

1. "Identification of Cuts of Veal," Nasco, Fort Atkinson, WI.
2. "Meat Cuts," Transparency Master, Vocational Education Productions, California Polytechnic College, San Luis Obispo, CA.
3. Meat Identification, Special Ciruclar 186, Cooperative Extension Service, The Pennsylvania State University, University Park, PA, 1974.
4. Meat Identification Kit, The Interstate Printers and Publishers, Inc., Third Edition, Danville, IL.
5. Romans, John R. and Zeigler, P. Thomas, The Meat We Eat, The Interstate Printers and Publishers, Inc. Danville, IL.
6. Uniform Retail Meat Identity Standards, National Livestock and Meat Board, 36 S. Wabash Avenue, Chicago, IL, 1973.
7. Lessons on Meat, National Livestock and Meat Board, 36 S. Wabash Avenue, Chicago, IL, 1970.

# VEAL AND CALF SLAUGHTER
## UNIT VII

## EXAMPLE 1

Cuts of Veal.

Leg or Round:

- Leg shank half
- Heel of round
- Round steak (cutlet)
- Leg rump half
- Standing rump roast

Loin:

- Loin roast
- Kidney chop
- Loin chop
- Sirloin steak

Rib:

- Rib roast
- Rib chop

Shoulder or chuck:

- Arm roast
- Arm steak
- Blade steak
- Blade roast

Breast:

- Breast

Variety Meats:

- Liver
- Heart
- Tongue
- Kidney

## VEAL AND CALF SLAUGHTER
## UNIT VII

### EXAMPLE 2

Veal and Calf Slaughtering.

1. Define:
   a. Vealer.
   b. Calf.
2. Vealers are sold on the market for slaughter purposes only.
3. The greatest supply of vealers comes from dairy farms during the ____________________and ____________________months.
4. Summarize the following grades of veal in terms of weight classes and dressing percentages:

| Grade | Weight classes | Dressing % |
|---|---|---|
| A. | | |
| B. | | |
| C. | | |
| D. | | |
| E. | | |

5. Define:
   a. Bob veal.

# DRESSING POULTRY
## UNIT VIII

## UNIT OBJECTIVE

Poultry varies considerably in health, body conformation, and amount of muscling and fat.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Given various types of poultry carcasses, identify market classes of birds and rank the carcasses according to body quality and condition.
2. Given various types of poultry carcasses, identify the characteristics which would lower their carcass grades.
3. Rank birds according to their body quality and condition.
4. While visiting a poultry processing facility, carefully observe the procedures used in dressing poultry.
5. Properly dress and cut up a chicken.
6. Distinguish the various kinds of dressed poultry.

# DRESSING POULTRY
## UNIT VIII

## INSTRUCTIONAL AREAS

1. Standards of quality for dressed poultry:

   a. A quality:

      1. Carcass free of deformities.
      2. Well developed covering of flesh.
      3. Well developed layer of fat in the skin.
      4. Free of pinfeathers.
      5. Free of exposed flesh.
      6. No broken bones.
      7. Practically free of discolorations of skin and flesh.

   b. B quality:

      1. Moderate deformities.
      2. Moderate covering of flesh.
      3. Sufficient fat to prevent a distinct appearance of flesh through the skin.
      4. May have a few nonprotruding pinfeathers.
      5. May have moderate amount of exposed flesh resulting from cuts, tears, and missing skin.
      6. Parts may be disjointed but free of broken bones.
      7. Carcass is free of serious discolorations.

   c. C quality:

      1. A part that does not meet the requirements for A or B.
      2. A carcass that does not meet the requirements for A or B.

2. The value of poultry and turkey for meat varies considerably with the breed.

3. Birds should receive careful handling to avoid bruises, abrasions, and broken bones.

4. Feed should be withheld 8 to 10 hours before the chickens are killed.

5. The fowl should be caught by the leg below the thigh.

6. Bleeding practices:

   a. Severing the neck.

   b. Cutting the throat.

   c. Dislocating the neck.

   d. Cutting the throat inside the bird's mouth.

7. Dry picking.

8. Scalding practices:

   a. Hot scalding is still the common practice employed in home dressing birds.

   b. Semi-scalding is used in all large poultry packing plants.

   c. Wax picking is usually used in combination with semi-scald method.

9. Immediate removal of body heat prior to being stored is essential.

10. Birds that are to be frozen should be full-dressed.

11. Classes of poultry:

   a. Chickens.

      1. Cornish hen.

         a. 5-7 weeks old.
         b. Not more than 2 lbs.

      2. Broiler or fryer.

         a. 9-12 weeks old.
         b. Either sex.
         c. Tender meat, soft, pliable skin.

      3. Roaster.

         a. 3-5 months old.
         b. Either sex.
         c. Tender meat, breastbone cartilage not as flexible as broilers.

      4. Capon.

         a. Unsexed male chicken.
         b. Under 8 months.
         c. Tender meat, smooth-textured skin.

      5. Stag or slip.

         a. Male chicken.
         b. Under 10 months.
         c. Coarse skin.
         d. Between a roaster and a rooster.

      6. Stewing.

         a. Female chicken.
         b. Over 10 months.
         c. Meat not tender.

7. Rooster.
    a. Mature male chicken.
    b. Coarse skin.
    c. Toughened and darkened meat.
    d. Hardened breastbone tip.

b. Turkeys.

1. Fryer-roaster.
    a. Under 16 weeks old.
    b. Either sex.
    c. Tender meat.
    d. Smooth-textured skin.
    e. Flexible breastbone cartilage.

2. Young hen.
    a. Female 5-7 months old.
    b. Tender meat.
    c. Smooth-textured skin.
    d. Breastbone cartilage less flexible.

3. Young tom.
    a. Male 5-7 months old.
    b. Tender meat.
    c. Smooth-textured skin.
    d. Breastbone cartilage less flexible.

4. Yearling hen.
    a. Matured female.
    b. Under 15 months old.
    c. Reasonably tender meat and smooth textured skin.

5. Yearling tom.
    a. Matured male.
    b. Under 15 months old.
    c. Reasonably tender meat and smooth textured skin.

6. Mature turkey.
    a. Hen or tom.
    b. Over 15 months.
    c. Coarse skin and toughened flesh.

c. Ducks

1. Broiling or frying duckling.
    a. Under 8 weeks old.
    b. Either sex.
    c. Tender meat.
    d. Soft bill.
    e. Soft windpipe.

2. Roaster duckling.
    a. Under 16 weeks old.
    b. Either sex.
    c. Tender meat.
    d. Bill not completely hardened.
    e. Easily dented windpipe.

3. Mature duck.
    a. Over 6 months old.
    b. Either sex.
    c. Toughened flesh.
    d. Hardened bill.
    e. Hardened windpipe.

d. Geese.

1. Young goose.
    a. Tender meat.
    b. Easily dented windpipe.

2. Mature goose.
    a. Toughened flesh.
    b. Hardened windpipe.

## METHODS OF EVALUATION

1. Conduct a field trip to local poultry processor and have each student evaluate the trip (Ex. 1).

2. Film--"Something to Crow About."

3. Have each student properly kill and dress a bird.

4. Have each student properly cut up a chicken.

5. Have each student place a class of birds and rank the carcasses according to quality and condition.

## INSTRUCTIONAL AIDS

1. How to Buy Poultry, USDA, Agricultural Marketing Service, Washington, DC, July 1968.
2. Potter, Norman N., Food Science, AVI Publishing Company, Inc., Westport, CT, 1973.
3. Poultry Grading Manual, Agriculture Handbook No. 31, USDA Consumer and Marketing Service, Washington, DC, May, 1971.
4. Romans, John R., and Zeigler, P. Thomas, The Meat We Eat, The Interstate Printers and Publishers, Inc., Danville, IL, 1974.
5. "Something to Crow About," Film Library, 31 Roberts Hall, Cornell University, Ithaca, NY.

# DRESSING POULTRY

## UNIT VIII

### EXAMPLE 1

### Evaluation of Poultry Dressing and Egg Processing Facilities

Answer the following questions in regards to the Poultry Dressing Plant:

1. When touring the plant, we were not allowed in the major processing rooms. Why do you think this was so?

2. Explain the procedure used to grade eggs. Begin with the time they were removed from the large racks until they were packaged.

3. Define candling.

4. What area of the Poultry Dressing Plant were you most impressed with? Why?

Answer the following questions in regards to the Egg Processing Plant.

1. Why was mineral oil applied to the eggs?

2. What was the temperature and humidity for the egg cooling room?

3. What were 3 things inspectors looked for when grading eggs?

   a.

   b.

   c.

4. What area of the Egg Processing Plant impressed you most? Why?

## SAUSAGES
## UNIT IX

### UNIT OBJECTIVE

The manufacture of sausages continues to flourish today as a colorful segment of the meat industry.

### PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Using the facilities of a meat processor, identify the types of sausages produced by sight, smell, and taste.

# SAUSAGES
## UNIT IX

### INSTRUCTIONAL AREAS

1. Sausages equal 1 out of every 7 1/2 pounds of meat produced.

2. About 250 varieties are available.

3. Sausages are now made up of more beef than pork.

4. Domestic sausages:

   a. Small sausages.

      1. Frankfurters both fresh and smoked.
      2. All-pork breakfast style.

   b. Large sausages:

      1. Two inches or over in diameter.
      2. Fine or coarse cut.
      3. Fresh or smoked.

   c. Luncheon meats.

   d. Meat loaf.

5. Pork sausages:

   a. Country style:

      1. Contains 10 to 20 percent beef ground with fresh pork.
      2. Does not contain sage.
      3. Sold unlinked.

   b. Breakfast style:

      1. All-pork sausage.
      2. Seasoned.
      3. Sold in links.

   c. Farm or country-style:

      1. Sausages must be prepared on the farm or in the country.
      2. If prepared in the same way as on the farm or in the country, the word "style" must be used.

d. Lean sausages

1. Contains 20 to 25 percent fat.
2. Addition of pork fat cheapens the sausage and increases shrinking percentage.
3. Sausages produced in Federally inspected plants cannot contain in excess of 50 percent trimmable fat.

6. Whole hog sausage:

a. Sausages prepared with fresh and/or frozen meat.

b. Made from 240 to 250 pound hogs.

7. Sausage meats:

a. Special 80 percent lean.

b. Regular 50 percent lean.

8. Casings:

a. Natural casings are made from middle wall of small and large intestines of cattle, hogs, sheep, and goats.

b. Cellulose is made from cotton linters.

c. Collagen is made from protein substances such as hides and skin.

9. Kolbassi is a European sausage which contains 80 percent pork and 20 percent beef.

## METHODS OF EVALUATION

1. Conduct a field trip to a sausage manufacturer.

2. Have each student evaluate the amount of ingredients in different kinds of sausages by being familiar with the label.

3. Conduct a shrinkage test with different types of sausages.

## INSTRUCTIONAL AIDS

1. Romans, John R. and Zeigler, P. Thomas, The Meat We Eat, The Interstate Printers and Publishers, Inc., Danville, IL, 1974.

# PRESERVATION AND STORAGE OF MEAT
## UNIT X

## UNIT OBJECTIVE

Various methods of preserving meat have been practiced through the ages, the most common of which are drying, smoking, salting, and freezing.

## PERFORMANCE OBJECTIVES

After completion of the unit, the student should be able to:

1. Using the facilities of a commercial meat processor, observe and evaluate the preservation and storage of meat at the wholesale level.
2. Using the facilities of a local supermarket, observe and evaluate the preservation and storage of meats at the retail level.
3. Properly select and wrap various meat products.

# PRESERVATION AND STORAGE OF MEAT
## UNIT X

## INSTRUCTIONAL AREAS

1. Jerked beef is meat cut into long strips and dried quickly in the sun.

2. Smoked meat was a method of preservation. The wood generally used was hickory and oak.

3. Salt meat.

4. Virginia hams:

    a. Old time--fine table salt rubbed into each ham and cured for seven weeks.

    b. Smithfield--curing process varied with salt and smoke.

5. Organisms of concern in meat:

    a. Botulism is the most deadly poison known to man.

    b. Staphyloccal food poisoning causes severe gastro-intestinal upset.

    c. Salmonella is a food-borne infection resulting from ingestion of potentially infectious microorganisms.

6. Curing ingredients:

    a. Salt is the most important of the curing ingredients.

    b. Sugar:

        1 Counteracts the astrigent quality of the salt.
        2 Enhances the flavor of the product.
        3 Aids in lowering the pH of the cure.

7. Curing methods:

    a. Dry salt cure.

    b. Dry sugar.

    c. Box curing (pressure).

    d. The hot salt cure.

    e. The sweet pickle cure.

    f. The combination cure.

   g. Pump pickling.

   h. The artery cure.

8. Storage units.

## METHODS OF EVALUATION

1. Conduct a field trip to observe various methods of meat preservation and storage.

2. Film--"Be a Better Shopper, 6 Store Brands vs. Name Brands."

3. Film--"Be a Better Shopper, 7 More Meats for Your Money."

## INSTRUCTIONAL AIDS

1. "Be a Better Shopper, 7 More Meats for Your Money," Film Library, 31 Roberts Hall, Cornell University, Ithaca, NY.

2. "Be a Better Shopper, 6 Store Brands vs. Name Brands," Film Library, 31 Roberts Hall, Cornell University, Ithaca, NY.

3. Home Storage and Preparation of Meat, Special Circular 188, Cooperative Extension Service, The Pennsylvania State University, University Park, PA, 1974.

4. How to Buy Meat for Your Freezer, USDA, Agricultural Marketing Service, Washington, DC, July 1974.

5. Romans, John R. and Zeigler, P. Thomas, The Meat We Eat, The Interstate Printers and Publishers, Inc., Danville, IL, 1974.

# MEAT, POULTRY AND EGG EVALUATION (JUDGING)
## UNIT XI

## UNIT OBJECTIVE

Meat, poultry and egg judging is one way of testing an individual's understanding of these three food products.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Using the facilities of a meat processing firm or a comparable facility, show proficiency in meat cut identification and carcass evaluation in a given amount of time.

2. Using the facilities of a poultry and egg processing firm or comparable facility, adequately judge a class or classes of live birds, dressed poultry, interior egg quality and exterior egg quality in a given amount of time.

# MEAT, POULTRY AND EGG
# EVALUATION (JUDGING)
# UNIT XI

## INSTRUCTIONAL AREAS

1. Three big things are important in meat:
    a. Muscling (conformation).
    b. Leanness or fatness.
    c. Quality--palatability.
2. Items which tell you:
    a. Muscling:
        1. Rib-eye area.
        2. Bulge and plumpness in round, chuck, and through loin and rib
    b. Leanness:
        1. Trimness over rib eye, lower rib, flank, brisket, round, chuck.
    c. Quality:
        1. Color--beef is bright cherry red, pork is bright greyish pink.
        2. Firm texture.
        3. Smooth texture.
        4. Marbling.
        5. Youth.
3. Poultry:
    a. Grading live poultry.
    b. Grading dressed poultry.
4. Eggs:
    a. Classification of exterior quality.
    b. Classification of interior quality.
        1. Candling.
        2. Broken out.

## METHODS OF EVALUATION

1. Have each student participate in a meats judging contest.
2. Have each student participate in a poultry and egg judging contest.
3. Have a class judging contest in the areas of meats, poultry, and eggs.
4. Have a Federal inspector discuss grading of meats, poultry, and eggs.
5. Summarize the specifications for egg quality (Ex. 1)

## INSTRUCTIONAL AIDS

1. Egg Grading Manual, USDA, Agricultural Marketing Service, Agricultural Handbook No. 75, Washington, DC, August 1975.
2. Poultry Grading Manual, USDA, Agricultural Marketing Service, Agricultural Handbook No. 31, Washington, DC, May 1971.
3. Poultry Judging Manual, Teacher Education Series, Department of Agricultural Education, The Pennsylvania State University, University Park, PA, 1977.
4. Romans, John R. and Zeigler, P. Thomas, The Meat We Eat, The Interstate Printers and Publishers, Inc., Danville, IL. 1974.

## EXAMPLE 1

### SUMMARY OF UNITED STATES STANDARDS FOR QUALITY OF INDIVIDUAL SHELL EGGS; SPECIFICATIONS FOR EACH QUALITY FACTOR

| Quality Factor | AA Quality | A Quality | B Quality | C Quality |
|---|---|---|---|---|
| Shell | Clean, unbroken. Practically normal. | Practically clean, unbroken. | Clean to slightly stained. Unbroken. May be slightly abnormal. | Clean to moderately stained. Unbroken. May be abnormal. |
| Air Cell | 1/8 inch or less in depth. May show unlimited movement and may be free or bubbly. | 3/16 inch or less in depth. May show unlimited movement and may be free or bubbly. | 3/8 inch or less in depth. May show unlimited movement and may be free or bubbly. | May be over 3/8 inch in depth. May show unlimited movement and may be free or bubbly. |
| White | Clear, firm. | Clear. May be reasonably firm. | Clear. May be slightly weak. | May be weak and watery. Small blood clots or spots may be present (not more than 1/8" in diameter). |
| Yolk | Outline slightly defined. Practically free from defects. | Outline may be faily well defined. Practically free from defects. | Outline may be well defined. May be slightly enlarged and flattened. May show definite but not serious defects. | Outline may be plainly visible. May be enlarged and flattened. May show clearly visible germ developement but no blood. May show other serious defects. |

| Dirty | Check | Leaker |
|---|---|---|
| Unbroken. May be dirty. | Checked or cracked but not leaking. | Broken so contents are leaking. |

Ag Prodts I-103-C

MEAT, POULTRY AND EGG
EVALUATION (JUDGING)
UNIT XI

EXAMPLE 2

## Egg Grading Score Card - Form 3

Individual Shell Eggs -- Interior Quality

Contestant's name ______________________ Contestant's number ________

|  | Egg Number | AA | A | B | Inedible | Tabulator's Score |
|---|---|---|---|---|---|---|
| TO BE CANDLED | 1. |  |  |  |  |  |
|  | 2. |  |  |  |  |  |
|  | 3. |  |  |  |  |  |
|  | 4. |  |  |  |  |  |
|  | 5. |  |  |  |  |  |
|  | 6. |  |  |  |  |  |
|  | 7. |  |  |  |  |  |
|  | 8. |  |  |  |  |  |
|  | 9. |  |  |  |  |  |
|  | 10. |  |  |  |  |  |
|  | 11. |  |  |  |  |  |
|  | 12. |  |  |  |  |  |
| BROKEN OUT | 13. |  |  |  |  |  |
|  | 14. |  |  |  |  |  |
|  | 15. |  |  |  |  |  |
|  | 16. |  |  |  |  |  |
|  | 17. |  |  |  |  |  |
|  | 18. |  |  |  |  |  |
|  | 19. |  |  |  |  |  |
|  | 20. |  |  |  |  |  |
|  | 21. |  |  |  |  |  |
|  | 22. |  |  |  |  |  |
|  | 23. |  |  |  |  |  |
|  | 24. |  |  |  |  |  |
|  |  |  |  |  | Tabulator's Total Score |  |

For edible eggs, deduct 2 points for each space an egg is placed away from the proper quality with a maximum deduction of 4 points per egg. Deduct 4 points for an inedible egg graded as edible. Deduct 4 points for an edible egg graded as inedible. Interior quality only to be considered. Perfect score is 96 points.

Ag Prodts I-105-C

MEAT, POULTRY AND EGG
EVALUATION (JUDGING)
UNIT XI
EXAMPLE 3
Egg Grading Score Card - Form 4

Individual Shell Eggs - Exterior Quality

Contestant's name ______________________ Contestant's number __________

| Egg Number | QUALITY | | | Dirty | Checked | Leaker | Tabulator's Score |
|---|---|---|---|---|---|---|---|
| | A | B | C | | | | |
| 1. | | | | | | | |
| 2. | | | | | | | |
| 3. | | | | | | | |
| 4. | | | | | | | |
| 5. | | | | | | | |
| 6. | | | | | | | |
| 7. | | | | | | | |
| 8. | | | | | | | |
| 9. | | | | | | | |
| 10. | | | | | | | |
| 11. | | | | | | | |
| 12. | | | | | | | |
| 13. | | | | | | | |
| 14. | | | | | | | |
| 15. | | | | | | | |
| 16. | | | | | | | |
| 17. | | | | | | | |
| 18. | | | | | | | |
| 19. | | | | | | | |
| 20. | | | | | | | |
| 21. | | | | | | | |
| 22. | | | | | | | |
| 23. | | | | | | | |
| 24. | | | | | | | |
| Tabulator's Total Score | | | | | | | |

Deduct 1 point for each space an egg is placed away from the proper quality or a maximum deduction of 3 points per egg. The eggs in this class will not be handled and each decision will be made on visible portion of shell. Exterior quality only to be considered. Perfect score is 72 points.

MEAT, POULTRY AND EGG
EVALUATION ( JUDGING)
UNIT XI

EXAMPLE 4

Live Market Poultry and Ready-To-Cook Poultry - Form 5

Contestant's name ________________________ Contestant's number ______

| Bird Number | QUALITY | | | | Tabulator's Score |
|---|---|---|---|---|---|
| | A | B | C | No Grade | |
| 1. | | | | | |
| 2. | | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | | | | |
| 7. | | | | | |
| 8. | | | | | |
| 9. | | | | | |
| 10. | | | | | |
| | Tabulator's Total Score | | | | |

A deduction of 2-1/2 points will be made for each space that a bird is placed away from the correct quality with a maximum cut of 5 points per bird. No Grade are birds of less than C quality. Perfect score is 50 points.

# MEAT, POULTRY AND EGG
# EVALUATION (JUDGING)
# UNIT XI

## EXAMPLE 5

## BEEF CARCASS QUALITY GRADING CARD

Form 2

Contestant's Name ............................................ Contestant's Number ..........................

| Carcass No. | Prime | | | Choice | | | Good | | | Standard | | | Commercial* | | | Utility | | | Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | High | Med. | Low | High | Med. | Low | High | Med. | Low | High | Med. | Low | High | Med. | Low | High | Med. | Low | |
| 1 | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | TOTAL SCORE | | |

Canner and Cutter grades will not be used in the contest.

*Since maturity is the factor between Standard and Commercial grades, carcasses will not be included in the contest which are close to borderlines of maturity between these grades. There is Commercial grade for carcasses from young animals, therefore, the spaces given to "Commercial" are not considered when scoring the carcasses from young animals.

Contestant is to place a check mark in the grade subdivision in the proper space to the right of the carcass number. Ten points are allowed for the correct grading of each carcass. A deduction of one point will be made for a one third grade above or below the official grade; three points will be deducted for two-thirds grade above or below the official grade; six points will be deducted for one full grade above or below the official grade. The score will be zero for a grade more than one full grade above or below the official grade. Perfect score will be 100 points.

EXAMPLE 5

## BEEF CARCASS YIELD GRADING CARD

Form 3

Contestant's Name ............................................ Contestant's Number ............................

| Carcass No. | GRADE | | | | | | | | | | | | | | | Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. 1 | | | No. 2 | | | No. 3 | | | No. 4 | | | No. 5 | | | |
| | High | Avg. | Low | High | Avg. | Low | High | Avg. | Low | High | Avg. | Low | High | Avg. | Low | |
| 1 | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | TOTAL SCORE | | | |

Contestant is to place a check mark in the grade subdivision in the proper space to the right of the carcass number. Ten points are allowed for the correct grading of each carcass. A deduction of one point will be made for a one third grade above or below the official grade; three points will be deducted for two-thirds grade above or below the official grade; six points will be deducted for one full grade above or below the official grade. The score will be zero for a grade more than one full grade above or below the official grade. Perfect score will be 100 points.

MEAT, POULTRY AND EGG
EVALUATION (JUDGING)
UNIT XI

EXAMPLE 6

## Meat Identification Score Card

Contestant's name____________________
School____________________
County____________________
Teacher(s)____________________
Contestant's number__________age______
Parent's name____________________
Home address____________________
Home telephone number____________________

Summary of Tabulator's Score

| Kind of meat | Score |
|---|---|
| Pork (fresh) | _____ |
| Pork (cured & smoked) | _____ |
| Variety meats | _____ |
| Beef | _____ |
| Lamb | _____ |
| Tabulator's total score | _____ |

Pork (fresh)

| Wholesale Cuts | Retail Cuts | Number | Score |
|---|---|---|---|
| Fresh ham (leg) | Fresh ham (leg), butt half | | |
| | Fresh ham (leg), shank half | | |
| | Fresh ham (leg), boneless | | |
| | Fresh ham (leg), center slice | | |
| Loin | Center loin roast | | |
| | Sirloin roast | | |
| | Blade loin roast | | |
| | Rib chop | | |
| | Loin chop | | |
| | Tenderloin | | |
| | Back ribs | | |
| Fresh side (belly) | Fresh side pork | | |
| Spareribs | Spareribs | | |
| Fresh picnic shoulder | Fresh picnic shoulder | | |
| | Arm roast | | |
| | Arm steak | | |
| Boston butt | Boston butt | | |
| | Blade steak | | |

Tabulator's Score

## EXAMPLE 6

Pork (cured and smoked)

| Wholesale Cuts | Retail Cuts | Number | Score |
|---|---|---|---|
| Smoked ham | Ham, butt half | | |
| | Ham, shank half | | |
| | Center ham slice | | |
| | Smoked loin | | |
| | Smoked loin chips | | |
| Smk'd pic. Shoul. | Smoked picnic shoulder | | |
| Smk'd should. butt | Smoked Boston shoulder roll | | |
| Bacon | Slab bacon | | |
| | Sliced bacon | | |
| | Jowl bacon square | | |
| | Canadian-style bacon | | |
| Salt pork | Salt side | | |
| | Salt fat back | | |

Tabulator's Score

Variety Meats

| Kind | | Number | Score |
|---|---|---|---|
| Heart | Beef | | |
| | Pork | | |
| Tongue | Beef | | |
| | Pork | | |
| Sweetbreads | | | |
| Brains | | | |
| Fresh pork sausage | | | |
| Fresh bulk sausage | | | |
| Lamb patties | | | |
| Beef for stew | | | |
| Ground beef | | | |

| Kind | | Number | Score |
|---|---|---|---|
| Liver | Beef | | |
| | Lamb | | |
| | Pork | | |
| Kidney | Beef | | |
| | Lamb | | |
| | Pork | | |

Tabulator's Score

EXAMPLE 6

Beef

| Wholesale Cuts | | Number | Score |
|---|---|---|---|
| Round | Round steak | | |
| | Top round steak | | |
| | Bottom round steak | | |
| | Eye round steak | | |
| | Sirloin tip cap on | | |
| | Sirloin tip cap off | | |
| | Heel of round | | |
| Rump | Standing rump | | |
| | Rolled rump | | |
| Sirloin (loin end) | Sirloin steak | | |
| | Top sirloin butt steak | | |
| | Boneless sirloin steak | | |
| Short loin | Porterhouse steak | | |
| | T-bone steak | | |
| | Club steak | | |
| | Top loin steak | | |
| | Tenderloin steak | | |
| Flank | Flank steak | | |
| Rib | Standing rib | | |
| | Rolled rib | | |
| | Rib steak | | |
| Chuck | Arm pot roast | | |
| | Arm steak | | |
| | Blade pot roast | | |
| | Blade steak | | |
| | English (Boston)cut | | |
| | Shoulder cut pot roast | | |
| | Inside chuck pot roast | | |
| Short plate | Plate (bone in) | | |
| | Rolled plate | | |
| | Short ribs | | |
| Brisket | Brisket (bone in) | | |
| | Boneless fresh brisket | | |
| Fore shank | Fore shank | | |
| | Shank cross cuts | | |
| | Corned beef brisket | | |

Tabulator's Score

## EXAMPLE 6

Lamb

| Wholesale Cuts | | Number | Score |
|---|---|---|---|
| Leg | French leg | | |
| | American leg | | |
| | Leg, steak | | |
| | Lamb leg, sirloin half | | |
| | Sirloin chop | | |
| Loin | Loin roast | | |
| | Loin chop | | |
| Rack | Rib roast | | |
| | Rib chop | | |
| Shoulder | Square-cut shoulder | | |
| | Rolled shoulder | | |
| | Arm chop | | |
| | Blade chop | | |
| Breast | Breast | | |
| | Riblets | | |
| Fore shank | Shank | | |

Tabulator's Score

# OCCUPATIONS IN DAIRY PRODUCTS INDUSTRY
## UNIT I

## UNIT OBJECTIVE

The dairy industry is undergoing constant changes. Modern methods of processing and distributing dairy products have created a need for highly trained individuals.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Compile a list of the occupations associated with the dairy products industry.

2. When given an application for employment at a dairy products firm, satisfactorily complete the application.

3. When on a field trip to a dairy products processing plant, identify the types of occupations observed.

## OCCUPATIONS IN DAIRY PRODUCTS INDUSTRY
## UNIT I

### INSTRUCTIONAL AREAS

1. Identify several occupations in the processing of fluid milk:
    a. Milk transporter.
    b. Milk receiver.
    c. Dairy products processing plant manager.
    d. Cream tester.
    e. Etc.
2. Identify several occupations in the processing of milk products:
    a. Cheesemaker.
    b. Buttermaker.
    c. Ice cream maker.
    d. Dairy products route salesman.
    e. Etc.

### METHODS OF EVALUATION

1. Given a list of occupational titles in the dairy products industry, the student must match the job titles with the job description.
2. After each field trip, the student must compile a list of the different job performances he observed.
3. Each student must submit to the teacher an adequate application for employment to each dairy products processing firm visited. This will aid the student in analyzing the different occupations observed, as well as knowing how to complete an employment application.

### INSTRUCTIONAL AIDS

1. Employment in Agricultural and Agribusiness Occupations--Region 3, Economic Research Service, USDA, Washington, DC, September 1974.

2. Hoover, Norman K., Handbook of Agricultural Occupations, The Interstate Printers and Publishers, Inc., Danville, IL, 1969.

3. Lewis, Wiley B., Review and Analysis of Curricula for Occupations in Food Processing and Distribution, Information Series No. 32, Clearinghouse on Vocational and Technical Education, The Ohio State University, Columbus, OH, December 1970.

4. Occupational Outlook Handbook, U.S. Department of Labor, Washington, DC, 1975-76.

5. Various sample job application forms from dairy products processing employers.

# COMPOSITION AND CONSTITUENTS OF MILK
## UNIT II

### UNIT OBJECTIVE

Milk has played a prominent role in the diets of people since primitive man. Sound nutritional research has established milk as a valuable food.

### PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Using the facilities of a quality control laboratory in a milk processing plant, or other comparable facility, determine the major composition of a sample of milk, with supervision from the technician and/or teacher.
2. Using the facilities of a quality control laboratory in a milk processing plant or other comparable facility, determine the fat content of select kinds of milk.

# COMPOSITION AND CONSTITUENTS OF MILK
## UNIT II

## INSTRUCTIONAL AREAS

1. Milk is a mixture of fats, proteins, carbohydrates, minerals, vitamins, and other miscellaneous constituents dispersed in water. It is a lacteal secretion practically free from colostrum, obtained by the complete milking of one or more healthy cows. It contains not less than 8.25 per cent milk solids-not-fat and not less than 3.25 per cent milkfat.

2. Fat is often referred to as "milkfat."

3. The dry matter of milk is known as "Total Solids."

   %T.S. = 100 - % water.
   %T.S. = S.N.F. + % Fat

4. "Solids-not-fat"

   % S.N.F. = 100 - (% water + % fat).

   a. Proteins, carbohydrates, and minerals.

   b. Water and fat taken out.

5. Gross composition of milk (Ex. 1).

6. Constituents of milk:

   a. Water:

      1. Serves as a dispersing medium for the solid consticuents
      2. Provides fluidity
      3. Makes up 87 percent of the volume

   b. Milkfat:

      1. All dairy products, with the exception of those made from skim milk, contain milkfat

   c. Proteins:

      1. Supply essential amino acids
      2. Remain uniformily dispersed throughout the milk
      3. One quart of milk will supply 50 percent of the recommended daily intake of protein for adults.

   d. Three milk proteins;

      1. Casein constitues 80 percent of total protein in milk.
      2. Lactalbumins.
      3. Lactoglobulins are especially important during the colostrum period.

   e. Lactose:

      1. Principal carbohydrate of milk.
      2. Referred to as "milk sugar".

   f. Minerals:

      1. Comes from feeds the cow consumes.
      2. Milk is an excellent source of calcium and phosphorous.
      3. Milk is a poor source of iron, copper, and iodine.

   g. Pigments:

      1. Carotene is responsible for the yellow color of milkfat.
      2. Riboflavin is yellowish-green in cheeses.

7. Collecting and handling milk samples;

   a. Farm sample:

      1. Milk at 40°F or less.
      2. Inspect for such characteristics as odor, sediment, churning, freezing.
      3. Agitate 5 minutes before taking the sample.
      4. Identify the sample.
      5. Use sterile equipment to take the sample.
      6. Place in a sterile container.
      7. Keep the sample between 33 and 40°F until delivered.

8. Milk testing:

   a. Babcock method.

   b. Gerber method.

   c. Mojonnie method.

## METHODS OF EVALUATION

1. Take a field trip to the quality control laboratory of a milk processor

2. Quiz on composition and nutritional value of milk (Ex. 2)

3. Conduct a laboratory experiment to determine the density of the fat globules in selected samples of milk (Ex. 3)

4. Conduct a laboratory experiment of milk testing using Babcock Method

## INSTRUCTIONAL AIDS

1. Consumer's Information Kit, "Basic Food Groups", Dairy Council Inc., Southampton, PA.

2. Foley, Richard C.; Bath, Donald L.; Dickinson, Frank N.; and Tucker, H. Allen; Dairy Cattle: Principles, Practices, Problems, Profits. Lea and Febiger, Philadelphia, PA, 1972.

3. Milk In Family Meals, USDA, Home and Garden Bulletin No. 127, Washington, DC, March 1972.

4. "Milk Information Sheet", National Dairy Council, Chicago, IL, 1972.

5. Potter, Norman N., Food Science, AVI Publishing Company, Inc., Westport, Conn., 1973.

6. Sampling, Collecting and Testing Milk, Circular 532, Cooperative Extension Service, The Pennsylvania State University, University Park, PA 1967.

7. Barnard, Sidney E. and Glass, Edward D. Jr., Collecting and Handling Milk Samples, Dairy Science Department, The Pennsylvania State University, University Park, PA, 1974.

8. Manual For Dairy Manufacturing Short Courses, Dairy Manufacturing Division, The Pennsylvania State University, University Park, PA.

# COMPOSITION AND CONSTITUENTS OF MILK
## UNIT II

## EXAMPLE 1

## MILK: COMPOSITION, NUTRITIONAL VALUE, AND CONSUMPTION TRENDS

The Gross Composition of Milk Showing Average Percentage by Weight of the Major Constituents and Normal Variations for Mixed Herd Milk.

| Constituent | Average Content | Normal Variation |
|---|---|---|
| Water | 87.20 | 82.0-89.0 |
| Fat | 3.70 | 2.5-6.0 |
| Casein ( rotein) | 2.80 | 2.3-4.0 |
| Lactalbumins and lactoglobulins (milk proteins, 2nd and 3rd) | 0.70 | 0.4-0.8 |
| Lactose (milk sugar) | 4.90 | 3.5-6.0 |
| Minerals (ash)<br>residue left after burning, primarily composed of minerals | 0.70 | 0.6-0.75 |
| Leucocytes | 100,000 | 10,000 - 10,000,000 |
| pH | 6.60 | 6.45-6.75 |

# COMPOSITION AND CONSTITUENTS OF MILK
## UNIT II

## EXAMPLE 2

## COMPOSITION & NUTRITIONAL VALUE OF MILK

1. Match

| | |
|---|---|
| a. Milkfat | _____1. Proteins, carbohydrates, minerals |
| b. Total solids | _____2. Fat |
| C. Solids-not-fat | _____3. Dry matter of milk |

2. Milk contains approximately _____________percent water.

3. All dairy products contain milkfat.

    a. True
    b. False

4. Where do the minerals present in milk come from?

5. What are the two basic minerals milk supplies?

    a.

    b.

6. Casein is a milk protein.

    a. True
    b. False

7. Define:

    a. Pasteurization:

    b. Carotene:

    c. Lactose

Problems: Using the attached sheet, answer the following:
(Show all work and do not round off to whole numbers)

1. How much water would be present in 3,000 gallons of milk?

## EXAMPLE 2

2. How much fat would be present in 3,000 gallons of milk?

3. What is the total solids present in 1,500 gallons of milk?

4. How many pounds of solids-not-fat are present in 500 gallons of milk?

5. How many quarts of milk are in a 200-gallon tank?

6. Given: 1 qt. milk = 2.15 lbs.

   a. How much does a gallon of milk weigh?

   b. How much would 2,500 gallons of milk weigh?

# COMPOSITION AND CONSTITUENTS OF MILK
## UNIT II

### EXAMPLE 3

A study of some of the constituents and physical properties of milk.

Microscopic appearance of fat globules.

Step 1 Place one drop of skim milk on the micro slide and carefully cover with cover glass. Be careful to handle the plates by the edges to avoid finger prints or other foreign matter on the plate.

Step 2 Observe the slide through the microscope.

Step 3 In the circle below, make a drawing of what you observe.

Step 4 Repeat the above process with samples of cream, raw milk, fortified milk, and homogenized milk. Make a drawing of what you observe in the appropriate circle.

# COMPOSITION AND CONSTITUENTS OF MILK
## UNIT II

## EXAMPLE 4

FACTORS CAUSING VARIATIONS IN FAT CONTENT

| Breed | % Fat | % S.N.F. | % T.S. |
|---|---|---|---|
| Holstein | 3.50 | 8.60 | 12.10 |
| Ayrshire | 3.90 | 8.78 | 12.68 |
| Brown Swiss | 4.00 | 8.80 | 12.80 |
| Guernsey | 5.00 | 9.80 | 14.08 |
| Jersey | 5.20 | 9.22 | 14.42 |

Milk from individuals within the same breed varies considerably in composition due to heredity and individuality.

# KINDS OF MILK
## UNIT III

### UNIT OBJECTIVE

Various kinds of milk have been developed to meet the needs of all people.

### PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Using the facilities of a milk processor, identify the steps fluid milk goes through before it is put in the milk case for sale.
2. Using the facilities of a milk processor, become familiar with pasteurization and homogenization.
3. Using the facilities of a retail store, identify the four kinds of fluid milk which are generally available.

# KINDS OF MILK
## UNIT III

### INSTRUCTIONAL AREAS

1. Whole milk must contain at least 3.25 percent milkfat and 8.25 percent solids-not-fat.

    a. Pasteurization destroys disease-producing bacteria that may be present in raw milk.

        1. Heat milk to 145° F and hold for 30 minutes, or
        2. Heat milk to 161° F and hold for 15 seconds.

    b. Skim milk has a fat content of 0.1 percent or less.

    c. Fortified milk contains added vitamins, minerals and/or milk solids-not-fat.

    d. Concentrated milk is the result of heating to reduce the amount of water present.

        1. Evaporated milk--more than half the water is taken out before it is homogenized and sealed in cans.
        2. Sweetened condensed milk--sugar is added directly to the milk prior to the evaporation or condensing process.

    e. Dried milk is made from either skim or whole milk.

        1. If skim milk is used, the final product is labeled nonfat dry milk.
        2. If whole milk is used, the final product is labeled dry whole milk.
        3. Both contain less than 5 percent moisture.

    f. Sweet acidophilus milk.

        1. Sweet acidlphilus is a blend of 1% lowfat milk with special lactobacillus acidophilus natural culture added. Scientific literature reports that acidophilus milk containing this microorganism is a desirable food.
        2. Sweet acidophilus is a trademark name for a product developed in the Food Science Dept. of North Carolina State University. It is made by a scientific process which permits the product to possess the same flavor as pasteurized milk.
        3. The microorganism used to make regular acidophilus milk has been cultivated and harvested by special processes developed by scientists at N. C. State University. The microbial cells are then added to pasteurized, cold milk to provide large numbers of

lactobacillus acidophilus. This enables the consumer to drink the milk without tasting a flavor foreign to that of regular pasteurized milk. When the milk is kept below 42° F the lactobacillus acidophilus will maintain a high level of viability for the life of the milk.

## METHODS OF EVALUATION

1. Take a field trip to a milk processing facility.
2. Take a field trip to a local supermarket to observe the different kinds of milk available.
3. Have each student complete Example 1.

## INSTRUCTIONAL AIDS

1. Consumer's Information Kit, "Basic Food Groups," Dairy Council Inc., Southampton, PA.
2. Foley, Richard C., Bath, Donald L., Dickinson, Frank N., and Tucker, H. Allen, Dairy Cattle: Principles, Practices, Problems, Profits, Lea and Febiger, Philadelphia, PA, 1972.
3. Milk in Family Meals, USDA Home and Garden Bulletin No. 127, Washington, DC, March 1972.
4. "Milk Information Sheet," National Dairy Council, Chicago, IL, 1972.
5. Potter, Norman N., Food Science, AVI Publishing Company, Inc., Westport, CT, 1973.
6. United States Standards for. . ., USDA Consumer and Marketing Service, Washington, DC.

   Grades of Dry Buttermilk
   Grades of Dry Whole Milk
   Grades of Nonfat Dry Milk (Roller Process)
   Grades of Nonfat Dry Milk (Spray Process)
   Instant Nonfat Dry Milk

# KINDS OF MILK
## UNIT III

## EXAMPLE 1

## KINDS OF MILK

1. List and discuss briefly 4 kinds of fluid milk which are normally available in retail stores.

   a.
   b.
   c.
   d.

2. List 3 types of concentrated or dried milk products which are available in retail stores. How do they differ from each other?

   a.
   b.
   c.

3. Fill in the chart below from material found on page 516 of Dairy Cattle: Principles, Practices, Problems, Profits.

| Product | Water | Fat | Protein | Carbonhydrates | Minerals |
|---|---|---|---|---|---|
| Whole milk | | | | | |
| Low-fat milk | | | | | |
| Skim milk | | | | | |
| Evaporated milk | | | | | |
| Sweetened condensed milk | | | | | |
| Dry whole milk | | | | | |
| Dry skim milk | | | | | |

4. Define the following:

   a. pasteurization
   b. homogenization
   c. evaporated milk
   d. sweetened condensed milk
   e. dried milk
   f. fortified milk

# PROCESSING AND DISTRIBUTING
# DAIRY PRODUCTS
# UNIT IV

## UNIT OBJECTIVE

Getting enough milk should be a pleasure. There is a whole array of dairy products to provide the daily supply of milk.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Using the facilities of the school classroom or laboratory, show proficiency in buttermaking.
2. Using facilities of a commercial cheese manufacturer, properly identify the types of cheese products made.
3. Using the facilities of the school classroom or laboratory, show proficiency in making ice cream.

# PROCESSING AND DISTRIBUTING
# DAIRY PRODUCTS
# UNIT IV

## INSTRUCTIONAL AREAS

1. Raw milk processing:
    a. Storage:
        1. Containers--bulk tanks, truck tanks, plant tanks.
        2. Condition--less than 40° F, two days.
    b. Clarification:
        1. Centrifugal clarifier--removes sediment and body cells.
    c. Pasteurization--kills disease producing organisms and lowers total bacteria count.
        1. Batch, 145° F for 30 minutes.
        2. High temperature short time (HTST)--161° F for 15 seconds.
    d. Homogenization, makes fat globules all the same size.
        1. Milk richer tasting.
        2. Whiter color.
        3. More whitening power when added to coffee.
    e. Separation and standardization.
    f. Cooling, reduced temperature from 161° F to less than 40° F.
    g. Packaging.
    h. Quality control.
2. Butter:
    a. Butter is made by churning pasteurized cream.
    b. Butter must have at least 80 percent milkfat.
    c. Whipped butter.
        1. Regular butter that has been whipped for easier spreading.
        2. Whipping also increases the volume of butter.

3. Cheese.

    a. Natural cheese is made directly from milk.

        1. Weigh and strain the milk.
        2. Fat test.
        3. Add the starter culture.
        4. Add the color.
        5. Add the rennet.
        6. Cut the curd.
        7. Cook the curd.
        8. Cheddar the curd.
        9. Milk the curd.
        10. Press the curd.

    b. Processed cheese is a blend of natural cheeses which have been shredded, mixed, and heated.

    c. Cottage cheese is a soft, unripened natural cheese.

    d. Identification of cheeses (Ex. 1).

4. Yogurt:

    a. Custard-like product made by fermenting milk with a special culture.

    b. Usually made from homogenized, pasteurized whole milk.

5. Ice Cream:

    a. Made from cream, milk, sugar, flavorings, and stabilizers.

    b. Must contain at least 10 percent milkfat.

    c. Air is present to prevent the ice cream from:

        1. Being too dense.
        2. Too hard.
        3. Too cold in the mouth.

    d. Overrun is the increase in volume caused by whipping air into the mix during the freezing process.

## METHOD OF EVALUATION

1. Conduct a laboratory experiment to demonstrate how butter is made (Ex. 2).

2. Have each student complete Example 3.
3. Conduct a field trip to a milk processing firm where milk products are produced (Ex. 4 and 5).
4. Conduct a field trip to a local jugging facility.
5. Conduct a laboratory experiment and/or class exercise in making ice cream (Ex. 6).
6. Review the film--"Milk and the Multitude."
7. Today's Dairy Foods (Ex. 7).
8. Conduct a laboratory experiment on sampling various kinds of ice cream in relation to how it is produced.

## INSTRUCTIONAL AIDS

1. Cheese Buying Guide for Consumers, USDA, Marketing Bulletin No. 17, Washington, DC, May 1961.
2. Cheese in Family Meals, USDA, Home and Garden Bulletin No. 112, Washington, DC, July 1973.
3. Federal and State Standards for the Consumption of Milk Products, Agricultural Handbook No. 51, USDA, Agricultural Marketing Service, Washington, DC, January 1974.
4. How to Buy Cheese, USDA, Agricultural Marketing Service, Bulletin No. 193, Washington, DC, September 1971.
5. How to Buy Dairy Products, USDA, Agricultural Marketing Service, Bulletin No. 201, Washington, DC, August 1972.
6. Judging and Scoring Milk and Cheese, Farmers' Bulletin No. 2259, USDA, Washington, DC, May 1975.
7. "Making Ice Cream at Home," Circular 566, Cooperative Extension Service, The Pennsylvania State University, University Park, PA, 1976.
8. "Milk and The Multitudes," Dairy Council, Inc., 1225 Industrial Highway, Southampton, PA.
9. "Milk for Manufacturing Purposes and Its Production and Processing," Federal Register, Vol. 37, No. 68, Washington, DC, April 7, 1972.
10. Potter, Norman N., Food Science, AVI Publishing Company, Inc., Westport, CT, 1973.
11. Today's Dairy Foods, Dairy Council, Inc., 1225 Industrial Highway, Southampton, PA.

12. U.S. Standards for . . ., USDA, Consumer and Marketing Service, Washington, DC.

    Dry Whey
    Edible Dry Casein (Acid)
    Grades of Bulk American Cheese for Manufacturing
    Grades of Butter
    Grades of Cheddar Cheese
    Grades of Colby Cheese
    Grades of Swiss Cheese, Emmenthaler Cheese
    Manufacture of Frozen Desserts

13. "World of Cheese," Modern Talking Picture Service, Inc., P.O. Box 3035, Harrisburg, PA, 17105.

# PROCESSING AND DISTRIBUTING
# DAIRY PRODUCTS
# UNIT IV

## EXAMPLE 1

## IDENTIFICATION OF CHEESES

**Blue**

Peppery flavor.
Body and texture are semisoft, pasty, crumbly.
White interior and marbled or streaked with blue veins of mold.

**Brick**

Moderately sharp flavor.
Body and texture are semisoft to firm, elastic, and has numerous small mechanical openings.
Color is creamy yellow.

**Brie**

Mild to pungent flavor.
Body and texture are soft and smooth.
Color is creamy yellow interior with an edible thin, brown and white crust.

**Cheddar** (mild)

Body and texture are firm and smooth with some mechanical openings.
Color is white to medium yellow-orange.

**Cheddar** (sharp)

Body and texture are smooth and waxy with some mechanical openings
Color is white to medium yellow-orange.

**Colby**

Mild to mellow flavor.
Body and texture are smooth and soft with numerous irregularly shaped openings.
Color is white to medium yellow-orange.

**Cream**

Mild, acid flavor.
Body and texture are soft and smooth.
Color is white to light cream.

**Gouda**

Mellow flavor.
Body and texture are semisoft to firm, smooth, and small irregular shaped or round holes.
Color is creamy yellow or medium yellow-orange interior, and may or may not have a red wax coating.

Monterey (Jack)

Milk to mellow flavor.
Body and texture are soft to semisoft and small openings are evenly dispersed throughout the cheese.
Color is white to light cream.

Mozzarella

Mild, delicate flavor.
Body and texture are slightly firm and is plastic.
Color is creamy white.

Muenster

Semisoft.
Body and texture are semisoft and small openings are throughout the cheese.
Color is creamy white interior with a yellow-tan surface.

Neufchatel

Similar to cream cheese.

Provolone

Mellow to sharp flavor with smoky and salty overtones.
Body and texture are firm and smooth.
Color is light creamy interior with a light-brown or golden yellow surface.

Swiss

Large round holes, light yellow

# PROCESSING AND DISTRIBUTING DAIRY PRODUCTS

## EXAMPLE 2

## BUTTERMAKING

A study of some of the constituents and physical properties of milk.

Milk Fat.

Step 1 Fill the 2 oz. milk sample jar not more than 1/2 full of cream.

Step 2 Put the cap on the jar and churn the cream into butter by shaking the jar back and forth, holding it horizontally. Continue shaking until a firm lump of butter appears.

Step 3 Drain off the fluid. What dairy product is made from this fluid?

Step 4 Wash butter twice with cold tap water, draining well each time. Note the consistency, color, flavor. Compare this to the commercially produced butter sample. Explain any differences.

# PROCESSING AND DISTRIBUTING
# DAIRY PRODUCTS
## UNIT IV

## EXAMPLE 3

## BUTTER

1. What is butter?

2. What vitamin is in greatest abundance?

3. What is the difference between Grade AA and Grade A butter?

4. One pound of butter equals how many kilograms?

5. Define:
   a. Sweet butter
   b. Sweet cream butter
   c. Whipped butter

6. How is butter made?

7. Will the price of milk affect the price of butter? Why or why not?

# PROCESSING AND DISTRIBUTING
# DAIRY PRODUCTS
# UNIT IV

## EXAMPLE 4

## EVALUATION OF A FIELD TRIP TO A MILK PROCESSING FIRM

Problem 1--The process of manufacturing cottage cheese and cream cheese at the Milk Processing Firm took the following steps. Describe what occurred as the milk product passed each area.

a. Dock receiving area—

b. Pasteurizing machine—

c. Separator—

Problem 2--How was the vat mixture cut into curds?

Problem 3--Explain how cream cheese was made.

Problem 4--In what way or ways was this plant or cheese-making process different from what you expected to see?

# PROCESSING AND DISTRIBUTING
# DAIRY PRODUCTS
# UNIT IV

## EXAMPLE 5

## MILK PROCESSING FIRM—SWISS CHEESE

1. How many gallons of milk were in each of the copper kettles?

2. Why were cheese wheels not made any more?

3. Explain the processes performed in the first curing room.

4. How long did the cheese remain in the aging cellar?

5. What was most impressive to you about this facility?

# PROCESSING AND DISTRIBUTING
# DAIRY PRODUCTS
# UNIT IV

## EXAMPLE 6

## ICE CREAM--1 GALLON

Step

1. Break two eggs in a small dish and thoroughly mix.
2. Put one cup sugar in a large pan.
3. Put two tablespoons cornstarch in the sugar and mix the two together.
4. Add one quart of milk.
5. Put in the beaten-up eggs.
6. Thoroughly mix together.
7. Cook over a low heat until it thickens.
8. Add two-three tablespoons of vanilla; use a taste test.
9. Pour into a freezer can.
10. Add one can of sweetened condensed milk and one can of evaporated milk.
11. Start the freezing process.

# PROCESSING AND DISTRIBUTING
# DAIRY PRODUCTS
# UNIT IV

## EXAMPLE 7

## TODAY'S DAIRY FOODS

PART I: Directions — Answer the following questions from _Today's Dairy Foods_ booklet in your kit.

1. Why is milk valued for calcium?
2. Why are milk's vitamin A and riboflavin important?
3. Is milkfat essential? Why or why not?
4. What is the caloric value of milk?
5. How much milk is recommended for teenagers?
6. What is the difference between:
    a. Sweet butter
    b. Sweet cream butter
    c. Whipped butter
7. Define: half & half

PART II: Problems
Directions — solve the following dairy problems using the metrics conversion slide table in your packet.

1. One gallon of milk equals how many liters?
2. How many liters are in 2 pts. of milk?
3. Milk should be stored at 40°F. How many degrees C is this?
4. One gallon of milk weighs __________kilograms.

# DAIRY PRODUCTS EVALUATION (JUDGING)
## UNIT V

### UNIT OBJECTIVE

The flavor of milk is the key to its popularity. Only when milk has been properly produced and processed can it be a pleasant and satisfying food.

### PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Score 10 samples of milk for flavor and odor.
2. Score 10 sediment discs.
3. Identify 10 cheese samples.
4. Score and evaluate 10 samples of cottage cheese.

## DAIRY PRODUCTS EVALUATION (JUDGING)
## UNIT V

### INSTRUCTIONAL AREAS

1. Off-flavors of milk and the scores appropriate for each (Ex. 1).

2. Flavors of milk may be caused by five factors:

   a. Health of the cow.

   b. Feeds consumed by the cow.

   c. Bacteriological action.

   d. Chemical changes.

   e. Absorption of foreign flavors after the milk is drawn.

3. Judging cottage cheese:

   a. Acid flavor is caused by bacteria used in manufacturing and should be mild and not unpleasant.

   b. Coarse taste.

      1. Too much diacetyl added.
      2. Bitter taste.

   c. Fermented/fruity flavor resembles vinegar, pineapple, or other fruit.

   d. High salt.

   e. Lacks freshness.

   f. Musty/yeast.

### METHODS OF EVALUATION

1. Conduct a class dairy products judging contest.

2. Participate in a local dairy products judging contest.

### INSTRUCTIONAL AIDS

1. Judging and Scoring Milk and Cheese, USDA, Farmers' Bulletin No. 2259, Washington, DC, May 1975.

## DAIRY PRODUCTS EVALUATION (JUDGING)
## UNIT V

### EXAMPLE 1

| | Flavor | Score |
|---|---|---|
| Bitter: | After taste<br>No smell | 35-37 |
| Foreign: | Disinfectant<br>Chloride | 33-36 |
| Feed: | Molasses<br>Sweet bran | 37-39 slight<br>35-37 |
| Flat: | Watery<br>No taste<br>Light | 37-39 slight |
| Garlic/ Onion | Onion or garlic salt | 33-36 slight<br>31-34 |
| High acid: | Almost sour | 33-36 |
| Malty: | Malted milk | 35-37 slight<br>33-36 |
| Metallic: | Puckers mouth<br>Cardboardy | 35-37 slight<br>33-36 |
| Rancid: | Stale taste | 33-36 slight<br>31-34 |
| Salty: | Salt<br>No smell | 37-39 slight<br>34-36 |
| Unclean: | High temperature | 33-36 slight<br>31-34 |
| No defect: | | 39-40 |

# IMPORTANCE OF CEREAL GRAIN FOODS
## UNIT I

## UNIT OBJECTIVE

The cereal grains provide the world's most important source of calories. Breakfast cereals are an example of a processed food made more convenient to help meet many people's nutritional needs.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Using available resource materials and visual aids, summarize the increasing importance of grain foods and breakfast cereals in today's lifestyles.
2. Using the facilities of a commercial grain foods processing plant or a local retail outlet, identify the types of cereal grain foods available to the public.
3. Using several types of cereal products available, become familiar with nutritional information published on the labels.

# IMPORTANCE OF CEREAL GRAIN FOODS
## UNIT I

## INSTRUCTIONAL AREAS

1. The cereal industry provides the world's most important sources of calories.

2. On a worldwide basis, rice is the most important cereal crop.

    a. Rice is grown largely in Asia.

    b. In the U.S., rice is grown in the states bordering the Gulf of Mexico.

3. The yield of rice on a worldwide basis is more than double that of wheat.

4. Principle cereal grains grown in U.S.

    a. Corn.

    b. Wheat.

    c. Oats.

    d. Sorghum.

    e. Barley.

    f. Rye.

    g. Rice.

    h. Buckwheat.

5. In the U.S. corn is the largest crop.

6. Today's cereals provide consumers with a wide choice of forms, flavors, textures, and nutrients.

7. All are important sources of carbohydrates.

    a. Carbohydrates are the most important energy source in man's diet.

    b. In the U.S., carbohydrates make up about half a person's intake of nutrients.

8. Changes in the way people live led to many changes in where and what they eat.

9. One of the earliest convenience foods was breakfast cereals.

10. Breakfast cereals are a basic part of the American diet.

    a. People like them.

    b. They are very convenient.

    c. They are low in cost.

    d. They have been developed to provide important nutrients that people need.

## METHODS OF EVALUATION

1. Filmstrip and tape, "The Increasing Importance of Grain Foods."

2. Filmstrip and record, "Breakfast Cereals in Today's Lifestyles."

3. Field trip to a local supermarket's cereal foods section.

4. Have each student list all cereal grain foods that are available to the public in a selected store.

## INSTRUCTIONAL AIDS

1. "The Increasing Importance of Grain Foods," Cereal Institute Inc., 135 S. LaSalle Street, Chicago, IL

2. "Breakfast Cereals in Today's Lifestyles," Cereal Institute Inc., 135 S. LaSalle Street, Chicago, IL

3. Hayden, Eugene B., "Breakfast and Today's Lifestyles," Journal of School Health, Vol. XLV, No. 2, Cereal Institute Inc., 135 S. LaSalle Street, Chicago, IL

4. Potter, Norman, N., Food Science, AVI Publishing Company, Inc., Westport, CT, 1973.

# OCCUPATIONS IN THE CEREAL INDUSTRY
## UNIT II

## UNIT OBJECTIVE

We are living in rapidly changing times. Changing lifesytles demand convenient, easy-to-serve foods. An increasing number of job opportunities are available in both breakfast cereals and bakery products.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Compile a list of the occupations associated with the cereal grain foods industry.
2. When given an application for employment at a cereal foods firm, satisfactorily complete the application.
3. When on a field trip to a cereal foods processing firm, identify the types of occupations observed.

# OCCUPATIONS IN THE CEREAL INDUSTRY
## UNIT II

### INSTRUCTIONAL AREAS

1. Identify several occupations associated with flour milling:
    a. Cereal chemist.
    b. Miller.
    c. Moisture sampler.
    d. Etc.
2. Identify several occupations associated with baking:
    a. Mixer.
    b. Moulder operator.
    c. Baker.
    d. Etc.

### METHODS OF EVALUATION

1. Given a list of occupational titles in the cereal industry, each student must match the job titles with the job description.
2. After each field trip, each student must compile a list of as many different job performances observed as possible.
3. Each student must submit to the teacher a completed application for employment to each cereal grain foods processing firm visited. This will aid the student in analyzing the different occupations observed as well as knowing the proper procedures for filling out an employment application.

### INSTRUCTIONAL AIDS

1. Employment in Agricultural and Agribusiness Occupations--Region 3, Economics Research Service, USDA, Washington. DC, September 1974.
2. Hoover, Norman K., Handbook of Agricultural Occupations, The Interstate Printers and Publishers, Inc., Danville, IL, 1969.
3. Information for Career Decisions, Pennscript, 5301 Jonestown Road, Harrisburg, PA

4. *Occupational Outlook Handbook*, U.S. Department of Labor, Washington, DC, 1975-76.

5. Various sample job application forms from cereal grain food employers.

# COMPOSITION AND STRUCTURE OF CEREAL GRAINS
## UNIT III

## UNIT OBJECTIVE

Grains are the dried fruits of grasses. As the plant grows and the grains develop and mature, nutrients are stored in various parts of the kernels. Although the grains differ in size and shape, the structural parts of the kernels are similar.

## PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Using the facilities of the school laboratory, identify the three major parts of cereal grains and state the primary use made of each part.
2. Using the facilities of a cereal grains processor, determine the moisture content of selected cereal grains that would eventually be used for processing.

# COMPOSITION AND STRUCTURE OF CEREAL GRAINS
## UNIT III

## INSTRUCTIONAL AREAS

1. Moisture content is one of the most important factors in the general composition of cereals.

2. Moisture content of 10 to 14 percent indicates properly ripened and dried grains.

3. Cereal grains contain 2/3 carbohydrates in the form of starches and sugars.

4. All cereal grains are plant seeds and contain:

    a. Endosperm.

        1. Starchy substance.
        2. Rich in protein.

    b. Hull or bran.

        1. Protective outer layer.

    c. Embryo or germ.

5. In processing, the hulls, bran, and germ are removed.

6. Bran is usually replaced in processed grains because it is rich in B vitamins and minerals.

7. Wheat kernel:

    a. Endosperm.

        1. Makes up about 83 percent of the kernel.
        2. Source of white flour.

    b. Bran.

        1. Makes up about 14 1/2 percent of the kernel.
        2. Generally used in animal and poultry feeds.

    c. Germ.

        1. Makes up about 2 1/2 percent of kernel.
        2. Contains fat which limits the keeping quality of flours.
        3. Usually added to animal and poultry feeds.

8. Kinds of wheat:

   a. Hard wheat.

      1. High in protein.
      2. Yields a stronger flour.
      3. Good for bread making.

   b. Soft wheat.

      1. Lower in protein.
      2. Yields a weaker flour.
      3. Better in cake making.

## METHODS OF EVALUATION

1. Field trip to a grain processor.

2. Laboratory exercise of microscopic inspection of corn and wheat kernels (Ex. 1).

## INSTRUCTIONAL AIDS

1. Breakfast Cereals: Part of Modern Life, Cereal Institute, Inc., 135 S. LaSalle Street, Chicago, IL

2. Potter, Norman N., Food Science, AVI Publishing Company, Inc., Westport, CT, 1973.

# COMPOSITION AND STRUCTURE OF CEREAL GRAINS
## UNIT III

## EXAMPLE 1

## LAB--MICROSCOPIC INSPECTION OF CORN AND WHEAT KERNELS

Directions: Cut a corn and a wheat kernel in half lengthwise and place under the microscope. Make a drawing of the parts which are observed.

# PROCESSING OF CEREAL GRAINS
## UNIT IV

### UNIT OBJECTIVE

The conversion of food grains from basically inedible forms to ready-to-eat and quick-to-serve foods has met consumer needs for convenient, appealing, and nutritious foods.

### PERFORMANCE OBJECTIVES

After completion of this unit, the student should be able to:

1. Using the facilities of a cereal grains processor, identify the milling systems for wheat.
2. Make a listing of some of the uses of wheat flour.
3. Using the facilities of a local retail outlet, identify some of the breakfast cereals available.

# PROCESSING OF CEREAL GRAINS
## UNIT IV

## INSTRUCTIONAL AREAS

1. Milling wheat:
    a. Disintegration made by rollers set progressively closer and closer together.
        1. Roller breaks open the bran and frees the germ from the endosperm.
        2. Second and third rollers further pulverize the endosperm.
        3. Flakes of bran and flattened germ are removed by sieves under first set of rollers.
        4. Pulverized endosperm is run through successive rollers set still closer together to grind it into finer and finer flour, which is also sifted under each set of rollers to remove the last traces of bran.
        5. As the flour is progressively milled, it becomes whiter in color, better in breadmaking, but lower in vitamin and mineral content.
    b. Uses of wheat flour.
        1. Preparation of alimentary pastes.
        2. Baked goods.
2. Rice:
    a. Rice milling is done with a series of machines which first feed whole grains of rice between abrasive discs or moving rubber belts.
    b. Rice enrichment.
        1. Coat the polish rice with an enrichment mixture.
        2. Parboiling the grains before removing hull, bran. and germ.
3. Corn:
    a. Dry milling.
    b. Wet milling.
        1. Main objective is to use water as a means of softening the corn kernels, floating off the lighter oil bearing germ, removing the hulls, separation by water suspension.

4. Barley, oats, rye:
    a. Each is used for animal feed.
    b. Barley and rye also used in production of fermented beverages and distilled liquors.
    c. Most oats are marketed as rolled oat breakfast cereals.
5. Breakfast cereals:
    a. Most breakfast cereals are made from the endosperm of wheat, corn, rice, and oats.
    b. Ready-to-eat cereals are the most popular in the U.S.
        1. Must be dried to about 3 to 5 percent moisture.

## METHODS OF EVALUATION

1. Field trip to a flour and cereal processor.
2. Evaluation of the field trip to flour mill (Ex 1).

## INSTRUCTIONAL AIDS

1. Breakfast Cereals in the American Diet, Cereal Institute, Inc., 135 S. LaSalle Street, Chicago, IL, December 1973.
2. Breakfast Cereals: Part of Modern Life, Cereal Institute, Inc., 135 S LaSalle Street, Chicago, IL. 1974.
3. Potter, Norman N., Food Science, AVI Publishing Company, Inc., Westport, CT. 1973.

# PROCESSING OF CEREAL GRAINS
## UNIT IV

### EXAMPLE 1

1. What do the terms head race and tail race have to do with milling?

2. Why were motors used in the mill other than to supply power when there was no water?

3. What was the purpose of the long cylinder bags that extended thru several floors?

4. How many floors were there in the mill and explain briefly what was happening on each floor.

5. What method of cleaning was used to help keep the mill clean inside?

6. What impressed you most about the tour and why?

# APPENDIX D

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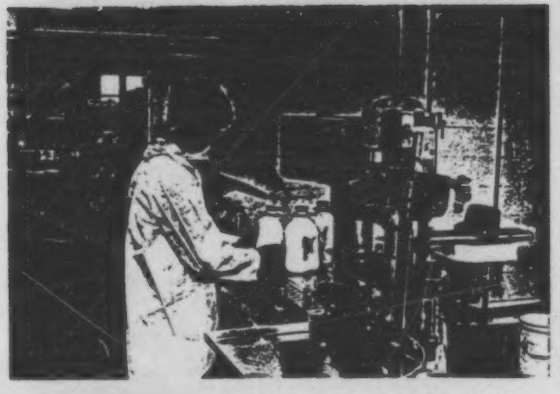
# Agricultural Products II

## A Teacher's Manual



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Department of Agricultural Education
College of Agriculture
The Pennsylvania State University
University Park, Pennsylvania

# AGRICULTURAL PRODUCTS II

Teacher Education Research Series

1978

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Agricultural Education Section, Bureau of Vocational Education
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# PREFACE

Agricultural Products II is a series of units in (a) Fruits, Vegetables, and Beverages, (b) Meats, Poultry, and Eggs, and (c) Dairy Products. The student activities, worksheets, and information sheets of each unit were designed to meet the needs of those students enrolled in the second year of the program and are presented to serve as guidelines for second-year students.

Students will be required to complete two correspondence courses from The Pennsylvania State University in the area of their interest. This will be in addition to the units presented in Agricultural Products II. Upon successful completion of the correspondence courses, the student will receive a certificate from the Correspondence Course Office at The Pennsylvania State University.

Students will be enrolled in the Cooperative Education Program. They will be placed in jobs in the area(s) of their interest according to the availability of a job in that area.

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## ACKNOWLEDGEMENTS

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## FRUITS, VEGETABLES, AND BEVERAGES
## UNIT I

STUDENT ACTIVITIES:

1. Plot the Futures Prices from the Wall Street Journal on the following foods for the period covered by the contract.
    - a. November Maine Potatoes
    - b. Idaho Potatoes
    - c. Sugar, World

2. Summarize the Futures Prices for each commodity in two or three sentences at end of the contract period.

3. Fill in the attached Cash Prices chart on the following foods for the period covered by the contract. These are found in the Wall Street Journal.
    - a. Potatoes

4. Read and give a one page summary of "New Maine Potatoes Contract Battle Could Be Concluded by Next Week," p. 24, October 1, 1976, Wall Street Journal.

5. Read and summarize, in three to four sentences, the following articles on p. 7 of Agricultural Outlook, 1976:
    - a. Generally Lower Fruit Prices Expected this Fall.
    - b. Potato Output May Hit a Record

6. Review: Fruit Situation, September 1976
   Vegetable Situation, August 1976.

7. Review the following texts:
    - a. Growing Tree and Small Fruits
    - b. Raising Vegetables
    - c. Approved Practices in Fruit Production

## FRUITS, VEGETABLES, AND BEVERAGES
## UNIT II

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on the assigned foods.

2. Summarize the Futures Prices when you turn in the unit.

3. Continue the Cash Prices chart on the assigned foods. This, as with the Futures Prices chart, should begin where you left off at the first lesson.

4. List the grades and tolerances of each grade for the following:

    a. Tomatoes
    b. Apples
    c. Peaches
    d. Pears
    e. Potatoes
    f. Green Beans

5. The student must show proficiency in hand grading samples of the above fruits and vegetables.

# FRUITS, VEGETABLES, AND BEVERAGES
## UNIT III

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on assigned fruits and vegetables.
2. Summarize the Futures Prices covered by the lesson.
3. Continue the Cash Prices on the assigned foods.
4. Summarize, to date, the Cash Prices on the assigned foods.
5. Read the following:
    a. Grade Names for Fresh Fruits and Vegetables and complete WORKSHEET 1
    b. Federal Marketing Orders for Fruits and Vegetables In Brief.
    c. Food Marketing Alert, November 20, 1976 and Complete WORKSHEET 2

## FRUTIS, VEGETABLES AND BEVERAGES
## UNIT III

### WORKSHEET 1--GRADE NAMES FOR FRESH FRUITS AND VEGETABLES

1. What does quality refer to?
2. Is grade labeling required by federal law?
3. Explain the new grading policy recently established by the USDA.
4. Why don't all products have the four grades?

# FRUITS, VEGETABLES AND BEVERAGES
## UNIT III

### WORKSHEET 2--FOOD MARKETING ALERT

1. Which four foods have been added to the plentiful list?
2. What are the two big holiday fruits?
3. Summarize the update on vegetables.

# FRUIT, VEGETABLES, AND BEVERAGES
## UNIT IV

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on assigned fruits and vegetables.
2. Summarize the Futures Prices covered by the unit.
3. Continue the Cash Prices on the assigned foods.
4. Read and summarize the following:
    a. Agricultural Outlook, November 1976, p. 6.
    b. "Prospects of European Potato Purchases Help Shore Up Slumping Prices," Agricultural Outlook, November 1976, p. 6.
    c. "Potatoes," Vegetable Situation, November 1976, p. 11.
    d. "Canners Agree to List Weight of Contents Before Being Processed," Wall Street Journal, November 15, 1976.
    e. "Processed Fruits, Vegetable Prices Climb After Long Decline as Production Drops," Wall Street Journal, November 26, 1976.
    f. "The World Food Shortage," The Country Gentleman, 1977, p. 24.

# MEATS, POULTRY, AND EGGS
## UNIT I

STUDENT ACTIVITIES:

1. Read chapters 1, 2, 3 - The Meat We Eat.

2. Complete attached WORKSHEET for chapters 1, 2, 3.

3. Read sections 1 and 2 in Uniform Retail Meat Identity Standards.

4. Complete attached WORKSHEET for sections 1 and 2.

5. Plot the Futures Prices from the Wall Street Journal on the following livestock and meat commodities for the period covered by the contract:

   a. October Cattle (CME)
   b. October Hogs (CME)
   c. September Iced Broilers (CBT)

6. Summarize the Futures Prices for each commodity in two or three sentences for the length of the contract period.

7. Fill in the attached Cash Prices chart on the following commodities for the period covered by the contract. These are found in the Wall Street Journal.

   a. Beef
   b. Hogs, Sioux City
   c. Hogs, Omaha
   d. Steers, Omaha
   e. Steers, Sioux City

8. Read the following:

   a. "Livestock Output Expanding," on p. 2 of Agricultural Outlook, September 1976.

   b. "Farm Prices Posted Modest 0.5% Drop In September 15 Month," p. 24, October 1, 1976, Wall Street Journal.

## MEATS, POULTRY, AND EGGS
## UNIT I

### WORKSHEET 1--CHAPTERS 1, 2, 3 THE MEAT WE EAT

1. Why does the U.S. consume two times more pork per person than New Zealand?

2. Broadly speaking our eating habits are governed by:

   a.
   b.
   c.

3. The overall consumer trend continues to be for (fatter, leaner) meats.

4. Define cholesterol:

5. What was the purpose of the Wholesome Meat Act of 1967?

6. Define steeling:

7. What are the 7 basic requirements that must be adequate in all Federal plants?

# MEATS, POULTRY, AND EGGS
# UNIT I

## WORKSHEET 2--SECTIONS 1 AND 2 - UNIFORM RETAIL MEAT IDENTITY

1. What are the 2 reasons for consumer confusion at the meat counter?

   a.
   b.

2. What is the estimated number of freak cuts of meat available in stores?

3. Define: Fanciful Names

4. What 3 items are included on the meat label?

   a.
   b.
   c.

# MEATS, POULTRY, AND EGGS
## UNIT II

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on the assigned livestock and meat commodities.

2. Summarize the Futures Prices when you turn in the unit.

3. Continue the Cash Prices chart on the assigned foods. This, as with the Futures Prices chart, should begin where you left off at the first unit.

4. Read the following:

   a. Livestock and Meat Situation, September 1976, p. 2 and 3.

   b. Uniform Retail Meat Identity Standards. Complete the WORKSHEET and carefully study the material presented in chapter 3. ALL primal (wholesale) cuts on p. 2 must be known upon completion of the unit.

# MEATS, POULTRY, AND EGGS
## UNIT II

### WORKSHEET--UNIFORM RETAIL MEAT IDENTITY STANDARDS

1. List the 9 major wholesale cuts of beef.

   a.
   b.
   c.
   d.
   e.
   f.
   g.
   h
   i.

2. How many ribs are in the beef forequarter?

3. The primal chuck contains ________________ribs.

4. The primal rib contains ___________ribs.

5. How many ribs are in a beef half?______________.

6. If the rib counting begins at the front, between which ribs is the cut made?

7. If the rib counting is reversed, between which two ribs is the cut made?

8. The beef chuck contains the _________through __________ribs.

9. The beef rib includes the __________through __________ribs.

# MEATS, POULTRY, AND EGGS
## UNIT III

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on the assigned livestock and meat commodities.
2. Summarize the Futures Prices when you turn in the unit.
3. Continue the Cash Prices chart on the assigned foods.
4. Read and summarize the following articles from the Wall Street Journal:
    a. "Ground Beef Consumption Hits Record as U.S. Becomes a 'Hamburger Society,'" in the October 18, 1976 issue.
    b. "Falling Beef and Pork Prices Cause Reduction in Meat Futures Trading," in the September 29, 1976 issue.
5. List and describe the six beef grades as found in Meat-Quality Grades for the Consumer.
6. List and describe the five yield grades as found in Meat-Yield Grades for the Consumer.
7. Read the following:
    a. USDA Yield Grades for Beef and complete WORKSHEET 1.
8. All of the major retail cuts of beef must be known at the completion of the unit.

# MEATS, POULTRY, AND EGGS
## UNIT III

### WORKSHEET 1--USDA YIELD GRADES FOR BEEF

1. What accounts for variations in yields of retail cuts?

   a.
   b.

2. USDA yield grades are based upon:

   a.
   b.
   c.
   d.

3. What is the most important yield grade factor?

4. Where is the ribeye muscle located?

5. A change of about __________ square inches in ribeye area makes a full yield change.

6. A (warm, cold) carcass weight is the weight used in yield grading.

7. It takes a change of _________pounds in carcass weight to make a full yield grade change.

# MEATS, POULTRY, AND EGGS
## UNIT III

### WORKSHEET 2--PROBLEMS: DRESSING PERCENTAGES AND USDA YIELD GRADES

1. Determine dressing percentages from the following live and dressed weights:

| | Live Wt. | Dressed Wt. | Dressing % |
|---|---|---|---|
| a. | 1090 | 682 | _____ |
| b. | 1345 | 884 | _____ |
| c. | 1110 | 685 | _____ |
| d. | 1110 | 693 | _____ |
| e. | 1005 | 598 | _____ |
| f. | 910 | 517 | _____ |
| g. | 975 | 616 | _____ |

2. Determine the dressed weight from the following:

| | Live Wt. | Dressed Wt. | Dressing % |
|---|---|---|---|
| a. | 1075 | _____ | 63.0% |
| b. | 1170 | _____ | 63.2% |
| c. | 1190 | _____ | 63.6% |
| d. | 1035 | _____ | 57.9% |
| e. | 1015 | _____ | 61.3% |
| f. | 1015 | _____ | 60.6% |
| g. | 1025 | _____ | 64.3% |

3. If you buy a 442 lb. USDA Prime beef side with a yield grade 2 for 73¢ per pound handling weight, determine:

   a. Cost of purchase $__________________

   b. Amount of usable beef if percentage yield grade is 77% __________________lbs.

   c. Actual cost per pound of usable beef. __________________¢ per lb.

# MEATS, POULTRY, AND EGGS
## UNIT IV

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on the assigned livestock and meat commodities.
2. Summarize the Futures Prices when you turn in the unit.
3. Continue the Cash Prices chart on the assigned foods.
4. Summarize, to date, the trends in the Cash Prices of the assigned foods.
5. Review the slides on Beef Identification.
6. Read the INFORMATION SHEET--FREEZING FACTS ABOUT MEATS, and complete the WORKSHEET.

# MEATS, POULTRY, AND EGGS
## UNIT IV

## INFORMATION SHEET

### FREEZING FACTS ABOUT MEATS

Freezing doesn't improve the flavor, texture, or color of meat. If poor quality meat is put in the freezer, poor quality will be taken out. If good quality meat is not prepared, packaged, frozen, and stored correctly, poor quality will be the result. REMEMBER--ONE STEP IS AS IMPORTANT AS ANOTHER--FROZEN FOODS HAVE A MEMORY! Don't try to "slip by;" you'll only be sorry if you do.

Regardless of the kind of meat--beef, veal, lamb, pork, poultry--you freeze, remember reliable research has found these facts to be true:

1. Have a good healthy animal and one that is about the "right size" (not too fat or too thin, not too old or too young; refer to individual sub-headings.)
2. Do not feed the animal for 24 hours prior to killing; however, give it adequate water.
3. Exciting or overheating an animal before it is killed will help prevent its bleeding freely.
4. Sanitary conditions are essential to reduce the growth of food spoilage bacteria.

5. All meats need to be chilled for a certain period of time (the length of time depends on the type of animal) before cutting and packaging the meat.
6. Always use moisture-vapor proof freezer packaging material and freezer tape. Meat bought at the meat market is not wrapped in moisture-vapor proof freezer material. Remove the cellophane-like paper and paper plate and rewrap the meat for freezing.
7. The drug store wrap is the best type for meats. This is done by placing the meat in the center of the moisture-vapor proof freezer paper and bringing the two opposite sides to the center, matching them together. Fold these over about 1/2 inch and continue to fold (at least two times) until the packaging material fits snugly around the meat. Turn the package over and bring each end to the center, being sure to press as much air from the package as possible (air left in the package causes the meat to dry out; also, the oxygen in the air will cause the fat to oxidize, thereby giving an off-flavor to the meat). Using freezer tape, tape the ends securely (folding the ends under about 1/2 inch before they are taped down is acceptable, provided it does not make a bulky closure).
8. If several pieces of meat (example--two steaks) are put in the same package, two pieces of paper can be put between the steaks. One piece of paper freezes to one steak and the other freezes to the other steak. By doing this you can get one steak out and replace the other steak in the freezer.

9. If exposed bones are not padded or wrapped with extra paper they will oftentimes break or cut the packaging material, thereby letting in air. Air will give the meat a white or grayish appearance and also dry it out.

10. Be sure to label and date the package. You may want to label and date each side so that regardless which side is exposed, you can tell what is in the package.

11. Overloading your freezer with unfrozen food can be disastrous. Never put more than 2 to 3 lbs. of unfrozen food per cubic foot of freezer space in the freezer at one time. If you have a 20 cubic foot freezer, 40 to 60 lbs. of unfrozen food is as much as you can safely put in your freezer at one time, provided the temperature in the basket of a chest-type (or on the nonfreezing shelf of an upright) is at least 0°F. Putting more than this in at one time will raise the temperature above 0°F. Slow freezing takes place above 0°F, and large ice crystals form in the meat, causing the tissue (cells) to break down. Upon thawing, the juices seep out and the meat will be dry when cooked. Also, if too much unfrozen food is put in at one time, it is possible that the temperature will be raised so high that the meat could spoil. Additional unfrozen food can be added to the freezer when the contents are completely frozen to 0°F. This is at least 12 to 24 hours later.

12. The temperature in the warmest place of your freezer should be at least 0°F, and colder if possible. All reliable research has shown the lower the temperature is below 0°F, the better the flavor, color, and texture of frozen food (meat, vegetables, fruits, and cooked foods).

13. Place meat to be frozen in the coldest part of the freezer. Some chest-type freezers have special freezing compartments. If yours does not, the sides and bottom are the coldest. Some freezers have designated a freezing shelf(s) whereas in other upright freezers all shelves are the same temperature. Consult your Use and Care booklet which came with your freezer.
14. By leaving a small space between each unfrozen package, they will freeze quicker.
15. After meat is completely frozen to 0°F (which should not take longer than 12 to 24 hours), store meat close together.
16. Be sure to put all meat in one section of the freezer. Then store all "like" packages together, for example--all packages of hamburger meat together, all pakcages of round steak together, so they will be easier to find.
17. Keep a record of what you put in your freezer and what you remove.
18. The refrigerator is the best place to thaw frozen meat. Meat is less likely to spoil or develop an off-flavor, and there will be less seepage of juices. Leave the meat wrapped. Be sure to allow adequate time for thawing. It generally takes three to four hours for each pound; however, this varies due to the size of the package, temperature of the refrigerator, etc.
19. Many people prefer to cook meat that still has a few ice crystals in it.

20. Common causes of poor quality frozen meat:

Freezer Burn (or the whitish appearance found on frozen meat)

1. Packaging material not moisture-vapor proof.
2. Air in the package.
3. Temperature above 0°F.
4. Fluctuation of temperature above 0°F.
5. Meat stored in the freezer too long.

Discolored Meat

1. Stored at temperature above 0°F.
2. Fluctuation of temperature above 0°F.
3. Slow freezing.
4. Opened package while thawing.

Off-Flavor

1. Oils in the feed.
2. Poor packaging material.
3. Stored too long.
4. Too much fat in the meat.
5. Air left in the package.
6. Meat not cooled properly.
7. Fluctuation in temperature above 0°F.
8. Not frozen and stored at 0°F or below.

Seepage of Juices

1. Slow freezing of the meat.
2. Fluctuation of the temperature above 0°F.
3. Storing at a temperature above 0°F.
4. Thawing at room temperature.

## INFORMATION SHEET

### PORK

A hog of about 200 to 225 pounds live weight is the best size to kill. There will be about 107 pounds of usable meat and about 19 pounds of fat from a 200 pound hog.

Kill, dress, and chill at 34°F for about one to two days, until the body heat is removed and also the animal odor. Cut into family size pieces.

Frozen pork--to be at its best--should not be stored too long. Pork is extremely fat and even at 0°F or below has a tendency to get rancid. Fresh pork chops should be used within 3 to 4 months; roasts, 4 to 8 months; liver and sausage, 1 to 2 months. Cured pork should be eaten within 1 to 2 months--the added salt hastens rancidity and the smoked flavor is lost.

### POULTRY

The size to kill depends on the method of cookery to be used. Many people dislike frozen poultry because of the dark meat around the bones, especially the leg and thigh. Chickens are grown so fast that these bones do not have time to calcify; therefore, the marrow seeps out and discolors the meat. Slow freezing encourages this seepage. If chickens are excited or hot before they are killed, this prevents their bleeding well, hence dark meat. In killing chickens, tie the feet together and hang on a wire with the head down and cut the head off, just back of the head where there is no bone. It is important that the blood drips so that the meat will be white.

For scalding, use water that is about 130°F to 140°F (212°F is boiling). To singe the bird, ignite rubbing alcohol in a small dish or use brown paper. White paper or newspaper leaves smoke on the bird. Wash the bird in a solution of 1 teaspoon baking soda to a gallon of water.

U.S. Department of Agriculture Research recommends after cleaning fresh killed poultry leave it in the refrigerator below 40°F for 12 hourse before freezing--to insure maximum tenderness.

In packaging cut-up fryers, ice cold water can be added to cover the chicken. This removes the air in the package and coats the meat with water.

Wrap liver and gizzards separately from the other parts of the chicken. These two pieces can give an off-flavor to the meat if kept stored too long. These parts should be used within 3 months. Poultry can be stored from 6 to 12 months and turkey, duck, and goose for 6 months.

Most homemakers do not raise their own chickens and buy them when there is a sale or special at the meat market. Be sure to remove them from the packaging material and discard the paper plate they may be on. These are not moisture-vapor proof.

## MEATS, POULTRY, AND EGGS
## UNIT IV

### WORKSHEET--PACKAGING AND PROTECTION OF AGRICULTURAL PRODUCTS

1. How large a business is the packaging industry?
2. What materials are used for food packaging?
3. List several types of food packages in use today.
4. What is the major function of food packaging?
5. In addition to protecting the product, what other things must the package do?
6. What should protective packaging retard?
7. List several major protective packaging requirements.
8. What are the primary functions of produce packaging?
9. What are the advantages of using polyethylene bags?
10. Why should fresh produce not be packaged in an airtight container?
11. What is meant by shrink-film packaging?
12. Describe the pulpboard or chipboard tray packaging of fruits and loose vegetables.
13. What is the one outstanding feature of shrink films?
14. What are the major types of shrink films?
15. List the advantages of using corrugated shipping containers.
16. Where are polyethylene box liners used extensively?
17. What materials are being used in packaging meat and seafood products?
18. What must be done to preserve desirable texture and juiciness of meats?
19. What material is most widely used to overwrap trays of fresh meat?
20. How can cured meats be packaged?

WORKSHEET (continued)

21. What is the cardinal principle for packaging cured, smoked, and table-ready meats for retailing?

22. For best protection, how are hot dogs packaged?

23. What are the advantages of skin tight vacuum packs for bacon?

24. Explain how fresh poultry is usually packaged.

25. How is frozen poultry usually shipped?

26. What is the primary problem in frozen meat and poultry packaging?

27. What are the effects of freezer burn on frozen foods?

28. What are the requirements for frozen fish packaging?

29. What is the usual consumer package for frozen fish fillets?

30. Give another method of protecting fish products against rancidity.

31. In what ways does packaging protect frozen foods?

32. What is meant by the terms "heat-in-bag" or "boil-in-bag" frozen foods?

33. List the standard types of packages and containers.

34. What is the purpose of heat processing?

35. What does a vacuum in canned foods help do?

36. Why must products like rhubarb, tomato juice cocktail, and some fish products be packed in enamel-lined cans?

37. What are some advantages of aluminum containers?

38. What are some advantages of glass containers?

39. What is the outlook for aerosol packaging of food?

# MEATS, POULTRY, AND EGGS
## UNIT V

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on assigned livestock and meat commodities.
2. Summarize the Futures Prices when you turn in the unit.
3. Continue to plot the Cash Prices.
4. Demonstrate skill in steeling.
5. Read the following:
    a. Freezing Facts About Meat and complete the WORKSHEET.
    b. Occupations and Quality Control in Meat Processing, Unit 2, pp. 12 to 28.

# MEATS, POULTRY, AND EGGS
## UNIT V

### WORKSHEET--FREEZING FACTS ABOUT MEAT

1. Why doesn't freezing improve the flavor, texture, or color of meat?
2. What is "the drug store wrap?"
3. How can several cuts of meat be packaged so as to prevent them from freezing together in the same package?
4. What effect does air have on meats?
5. What will overloading a freezer with unfrozen meat do to the temperature?
6. What should be the temperature in the warmest place of a freezer?
7. In general, where is the coldest place in a chest type freezer?
8. How long will it take meat to freeze at 0°F?
9. What is the most desirable pork butchering weight?
10. What is the major problem encountered with the freezing of poultry?

## MEATS, POULTRY, AND EGGS
## UNIT VI

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on the assigned livestock and meat commodities.
2. Summarize the Futures Prices when you turn in the unit.
3. Continue the Cash Prices chart on the assigned foods.
4. Summarize the Cash Prices trends to date.
5. Read the following:
    - a. "Quality Control in the Meat Processing Industry," Occupations and Quality Control in Meat Processing, p. 12, and complete the WORKSHEET.

# MEATS, POULTRY, AND EGGS
## UNIT VI

## WORKSHEET--QUALITY CONTROL IN THE MEAT PROCESSING INDUSTRY

1. What physical factors of meat quality can be seen?

   a.
   b.
   c.
   d.

2. What physical factors can be judged by taste?

   a.
   b.
   c.

3. What does quality control involve?

   a.
   b.
   c.
   d.

4. Where does meat grading begin?

5. What are the three factors considered in grading meat?

   a.
   b.
   c.

6. Define:

   a. Conformation
   b. Quality
   c. Cutability

7. What factors determine cutability?

   a.
   b.
   c.
   d.

8. What are "brand names?"

9. Why are bones in meat of special interest?

WORKSHEET (continued)

10. List the 7 groups of bones.

| | |
|---|---|
| a. | e. |
| b. | f. |
| c. | g. |
| d. | |

11. What are the bone characteristics for:

    a. young animals
    b. older animals

12. List the 7 basic retail cuts of meat.

| | |
|---|---|
| a. | e. |
| b. | f. |
| c. | g. |
| d. | |

## MEATS, POULTRY, AND EGGS
## UNIT VII

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on the assigned livestock and meat commodities.
2. Summarize the Futures Prices when you turn in the unit.
3. Continue the Cash Prices chart on the assigned foods.
4. Read and summarize the following:
    a. "The World Food Shortage," The Country Gentleman, Winter 1977, p. 24.

    b. Livestock and Meat Situation, November 1976. Summarize the following:

        1. Cattle--1977
        2. Hog Slaughter--1977
        3. Veal and Lamb--1977
        4. 1977 Prices -- Cattle -- Hogs

    c. "Strong Demand to Bolster Farm Prices and Income in 1977," Agricultural Outlook, December 1976, p. 1.

    d. "Food Outlook for 1977," Agricultural Outlook, December 1976, p. 7.
5. Review--Meat Identification Kit with special attention to Beef and Pork Cuts Identification.

## DAIRY PRODUCTS
## UNIT I

STUDENT ACTIVITIES:

1. Read chapter 1 in Dairy Cattle and answer the 7 questions at the end of the chapter.

2. Read the following:

   a. "Farm Prices Posted Modest 0.5% Drop in September 15 Month," p. 24, October 1, 1976, Wall Street Journal.

   b. "Soviets Buy Added 15 Million Bushels of American Wheat," p. 24, October 1, 1976, Wall Street Journal.

   c. "Feed Grains Supply Currently Tight: Record Corn Crop in Prospect," p. 4 and 5, Agricultural Outlook, September 1976. Summarize.

3. Plot the Futures Prices from the Wall Street Journal on the following grains and feeds commodities for the period covered by the contract:

   a. September Wheat, Chicago Board of Trade
   b. September Corn, Chicago Board of Trade
   c. September Oats, Chicago Board of Trade

4. Summarize Futures Prices for each commodity in 2 or 3 sentences for length of the contract period.

5. Complete the Cash Prices chart on the following commodities for the period covered by the contract. These are found in the Wall Street Journal.

   a. Flour
   b. Butter
   c. Corn
   d. Barley
   e. Rye

6. Prepare a one page report on any dairy foods or dairy products article of your choice.

# DAIRY PRODUCTS
## UNIT II

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on the assigned feed and grain commodities. Remember to begin where you left off from the first unit.
2. Summarize the Futures Prices when you turn in the unit.
3. Continue the Cash Prices chart on the assigned foods. Begin the Futures Prices chart where you left off from the first unit.
4. Carefully review the September 1976 Dairy Situation Report beginning on page 5 and complete the WORKSHEET.
5. Read chapter 28 in Dairy Cattle and answer the questions at the end of the chapter.

## DAIRY PRODUCTS
## UNIT II

WORKSHEET--DAIRY SITUATION: SITUATION AND OUTLOOK

1. Milk production during August was up almost 6 percent from a year ago. What one factor is regarded by most as causing this 6% increase?
2. As of July 1, 1976 how many milk cows were there in the U.S.?
3. As of August 1, what was the current milk-feed price ratio?
4. Define milk-feed price ratio.
5. Summarize the World Dairy Situtation.

# DAIRY PRODUCTS
## UNIT III

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on the assigned feed and grain commodities.

2. Summarize the Futures Prices when you turn in the unit.

3. Continue the Cash Prices chart on the assigned foods.

4. Read Chapter 29 in Dairy Cattle and answer the questions at the end of the chapter.

5. In Agricultural Outlook, October 1976, p. 9:

    a. Read -- "Milk Production Continues Whopping Gains This Summer."

    b. Read--"USDA Raises Support Price for Milk" and complete the WORKSHEET.

# DAIRY PRODUCTS
## UNIT III

WORKSHEET-- USDA RAISES SUPPORT PRICE FOR MILK

1. As of October 1, what was the support price for manufacturing milk?
2. Define support price.
3. Define parity.
4. When does the dairy marketing year begin?
5. Why were dairy price supports increased?
6. Why would the CCC purchase butter, cheddar cheese, and non-fat dry milk?

# DAIRY PRODUCTS
## UNIT IV

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on the assigned feed and grain commodities.
2. Summarize the Futures Prices when you turn in the unit.
3. Continue the Cash Prices chart on the assigned foods.
4. Summarize, to date, the trends in the Cash Prices of the assigned foods.
5. Babcock milk testing of selected samples of milk.
6. Read the following:

   "The Babcock Test and Equipment," Testing Milk and Milk Products, p. 11, and complete the WORKSHEET.

## DAIRY PRODUCTS
## UNIT IV

WORKSHEET--TESTING MILK AND MILK PRODUCTS

1. What is the Babcock test?

2. What are the two principles of this method?

   a.

   b.

3. Why use sulfuric acid?

   a.

   b.

   c.

4. In a raw milk sample, which is lighter in weight:

   a. milk
   b. fat

5. What is a centrifuge?

6. Why is centrifugal force used in testing milk?

7. What is a pipette?

8. Draw and label the graduated scale of the neck of the test bottle.

9. The amount of milk used for testing is ____________ milliliters or ________________ grams.

10. The temperature of the milk sample should be ______ to ____________ degrees.

WORKSHEET (continued)

11. List and thoroughly explain the steps used in testing milk by the Babcock method (12 steps).

## DAIRY PRODUCTS
## UNIT V

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on the assigned feed and grain commodities.

2. Summarize the Futures Prices when you turn in the unit.

3. Continue the Cash Prices chart on the assigned foods.

   Read the following:

   a. "Feeding the Milking Herd," Dairy Cattle, and answer the questions at the end of the chapter.

   b. "Bloom is Off Dairy Prices," Agricultural Outlook, November 1976, p. 5. Summarize.

4. Become familiar with the Pearson Square by working some example problems. Complete the WORKSHEET.

# DAIRY PRODUCTS
# UNIT V

## WORKSHEET--PEARSON SQUARE

1. 20% crude protein desired
   Have legume with 15.2% crude protein
   Supplement with 80% crude protein

2. 18% crude protein desired
   Have corn silage with 0.5% urea at 10% crude protein
   Supplement with 80% crude protein

   Determine the proportion of each feed to mix which results in a mixture with 18% crude protein using the Pearson Square.

3. 16% crude protein desired
   Have corn with 6.6% crude protein
   Protein supplement with 80% crude protein

   Determine the proportions of each feed which results in a mixture with 16% crude protein using the Pearson Square.

# DAIRY PRODUCTS
## UNIT VI

STUDENT ACTIVITIES:

1. Continue to plot the Futures Prices on the assigned feed and grain commodities.
2. Summarize the Futures Prices when you turn in the unit.
3. Continue the Cash Prices chart on the assigned foods.
4. Summarize the Cash Prices when you turn in the unit.
5. Read the following:
    a. "The World Food Shortage," The Country Gentlemen, Winter 1977, p. 24. Summarize.
    b. "Strong Demand to Bolster Farm Prices and Income in 1977," Agricultural Outlook, December 1976, p. 1.
    c. "Food Outlook for 1977," Agricultural Outlook, December 1976, p. 7.
    d. The Cleaning and Sanitizing of Dairy Equipment and Trouble-Shooting Films and Deposits on Equipment. Carefully read the INFORMATION SHEET and complete the WORKSHEET.

# DAIRY PRODUCTS
# UNIT VI

## INFORMATION SHEET

## THE CLEANING AND SANITIZING OF DAIRY EQUIPMENT

### Types of Soil

When developing methods for the cleaning and sanitizing of dairy equipment, the primary concern is to remove the various soils that form on equipment surfaces. Such soils, unless they are completely removed, provide a nutrient source and a breeding ground for bacteria that subsequently will contaminate milk and dairy products.

1. Organic Soils. These include the fats, proteins, and sugars that are the major constituents of milk.

2. Mineral Soils. Mineral soils are not as obvious as the organic soils derived from milk. These soils result from the precipitation to surfaces of certain inorganic salts that are responsible for contributing "hardness" to water such as calcium, magnesium, and iron salts.

### Types of Cleaners

The basic types of cleaners used to accomplish the chemical removal of soils from dairy equipment are 1) alkaline cleaners, and 2) acid cleaners.

1. Alkaline cleaners. These are the oldest and most familiar of the dairy cleaners. Their primary function is to provide the chemical action required for the removal of organic soils from equipment surfaces.

C

2. Acid cleaners. These products are composed of mild organic and mild inorganic acids individually or in various combinations. Their principal function in a balanced cleaning program is to prevent the accumulation of mineral deposits on dairy equipment, and to remove accumulated mineral deposits such as occur when milkstone forms because of poor cleaning programs.

## Factors Affecting the Function of Cleaners

Cleaners and cleaner ingredients serve definite and specific functions in a cleaning program.

1. Concentration of cleaner. To be effective, cleaning agents must be used at concentrations recommended by the manufacturer for a specific cleaning job.

2. Temperature of cleaning solutions. Cleaners must be used at temperatures within the range specified by the cleaner manufacturer. At higher temperatures cleaner ingredients may undergo reversion or breakdown. At low temperatures sufficient chemical action is not provided.

3. Contact time. Time must be allowed for the cleaner to react with the soil to remove it chemically.

4. Application of cleaners. Use the right cleaner for the job at hand.

## Cleaning Procedures

As regards cleaning procedures, there are certain fundamental steps which are inherent to any good cleaning program regardless of whether hand cleaning or circulation cleaning is being employed. An outline of these follows:

## INFORMATION SHEET

1. Pre-rinse. Immediately after use, all equipment and utensils should be rinsed with lukewarm (100 - 110°F) water ro remove and prevent drying of milk solids.

2. Washing. Prepare appropriate cleaning solutions.

3. Rinse. Following washing, rinse all equipment to remove suspended soils and traces of cleaning compounds.

4. Storage. Following rinsing, all utensils and equipment should be stored in a manner that permits water to drain and the equipment to air dry with protection from possible gross recontamination.

### Sanitizing Procedures

Equipment should be sanitized before its next use to reduce residual bacterial contamination of surfaces. Cleaning by itself does not eliminate all types of bacteria, although good cleaning does reduce the initial bacterial concentration. Furthermore, equipment which has not been properly cleaned cannot be properly sanitized since residual soils protect bacteria from sanitizer action. In short, sanitizers do not compensate for poor cleaning jobs.

Sanitizing itself refers to a process of treating equipment with heat or chemcials to inactivate most, but not necessary all, of the bacteria present. It is not a sterilization process although these two terms are often interchanged erroneously. Sterilization is defined as being a process that destroys all microorganisms and their spores. This condition is probably never achieved in a sanitizing procedure.

## INFORMATION SHEET

With regard to sanitizing agents, those that are most frequently employed use either heat or chemicals to provide the sanitizing effect.

1. Heat. Heat is the most positive acting of the sanitizing agents and also is the most costly. Hot water at minimum conditions of 170°F for 5 minutes contact time is the most practical method of heat application.

2. Chemicals. Certain chemical compounds are effective for the sanitization of dairy equipment. These include (a) chlorine bearing chemicals, (b) iodophors, (c) quaternary ammonium compounds, and (d) phosphoric acid-wetting agent complexes.

In order for chemical sanitizers to be effective, equipment must first be thoroughly cleaned. Recommended concentrations must be followed, and equipment must not be rinsed with water following sanitizing. For best results, equipment should be sanitized just immediately before use and the sanitizer allowed to drain from the surface.

### Controlling Mold Growth

Molds are small forms of plant life that produce typical cottony or powdery growth on surfaces that they contaminate.

The growth of molds in milk handling and processing areas creates an unsightly appearance that causes an unfavorable impression with regard to the sanitary care exercised. Control of mold growth in milk handling and processing buildings can be accomplished by periodically treating interior surfaces of buildings with suitable chemicals that prevent mold growth. Procedures recommended are as follows:

## INFORMATION SHEET
## Trouble-Shooting Films/Deposits on Equipment

| FILM/DEPOSIT | DESCRIPTION OR IDENTIFICATION | *CAUSE | REMOVAL | PREVENTION |
|---|---|---|---|---|
| Protein | Blue-rainbow hue varnish like "apple sauce" | 1. Using non-chlorinated cleaner<br>2. Inadequate pre-rinse<br>3. Improper (sporadic or periodic) cleaning<br>4. Improper initial clean-up | Initial clean-up equal parts, chlorine, cl. alkaline detergent, hot water | 1. Chlorinated Alk. Det.<br>2. Proper cleaning with proper dilution after each usage.<br>3. Adequate pre-rinse |
| Milkstone or Waterstone | White to yellow | 1. Mineral from milk<br>2. Mineral from water | A. Initial cleaning<br>B. Acid wash | Regular and proper cleaning procedures coupled with acidified rinse |
| Fat/Grease | Hanging water droplets<br>Greasy (white) appearance<br>Oil | 1. Same as protein<br>2. Low temp. or improper detergent concentration<br>3. Regular use of acids in washing<br>4. Pulsator oil on equipment surface | Initial clean-up | Regular and proper cleaning procedures coupled with acidified |
| Mineral (Calcium, Magnesium) | White (Waterstone)<br>Chalky to gray | 1. Improper rinsing<br>2. Drop-out of minerals from water supply<br>3. No acidified rinse<br>4. Non-compatible alkaline detergent<br>5. Failure to use acid detergents | Acid wash | 1. Acid rinse<br>2. Product used has good water conditioning properties<br>3. Water softener or treatment |

## INFORMATION SHEET

| FILM/DEPOSIT | DESCRIPTION OR IDENTIFICATION | *CAUSE | REMOVAL | PREVENTION |
|---|---|---|---|---|
| Iron | Red to brown/ black | 1. Water supply<br>2. Iron from system components<br>3. Improper procedures | Acid wash | 1. Regular effective acid rinse<br>2. Water treatment<br>3. Proper selection of sanitizers |
| Silica | White to gray glazed appearance | 1. Use of mech. al. for manual cleaning<br>2. Poor rinsing<br>3. Water supply<br>4. Failure to manually clean outside surface of equip., clean inside mech. | Special acid wash | 1. Complete post rinse<br>2. Regular effective acid rinse<br>3. Water treatment<br>4. Manually clean outside surface of equip., clean inside mechanically. |
| A. Inking (blacking) | A. Black in rubber parts | 1. Reaction between chlorine or chlorinated compound and rubber | Acid wash<br>If not removed, replace | 1. Acid rinse<br>2. Proper dry storage |
| B. Black | B. Black residue deposit | 1. Rubber migration<br>2. Contact of dissimilar materials | acid wash<br>If not removed, replace | 1. Acid rinse<br>2. Proper, dry storage<br>3. Proper installation |
| Wetting agent | Blue | Poor/inadequate rinsing | Initial clean-up | 1. Proper compound<br>2. Proper rinsing |
| Factory soil | Grease, factory dirtblack deposit rusting | Improper or no initial clean-up | Initial clean-up | Thorough cleaning before equip. is used -- initially. |

## INFORMATION SHEET

| FILM/DEPOSITS | DESCRIPTION OR IDENTIFICATION | * | REMOVAL | PREVENTION |
|---|---|---|---|---|
| Corrosion | Rust/pitting | Iron, tramp metal particles, improper chemical usage. Freezing of sanitizing solution of B.T. | A. Acid wash and abrasive action<br>B. Repolishing (buffing) if bad corrosion-re-passivation | Proper procedures and passivating acid rinse |
| Etching | Pitted and white discoloration "imbedded" in St. Steel surface | Improper use of chemicals<br>Use of improper chemicals | Repolish re-passivation | Proper procedures and passivating acid rinse |

* Causes for films and deposits are all in the realm of poor procedures (improper cleaning, rinsing, etc.) or incompatible products. In mechanical cleaning, problems may be also due to malfunction of the system or lack of proper solution control.

| | | | | |
|---|---|---|---|---|
| Plastics | (In addition to the above) | | | |
| Opaque | Lack of transparenency<br>White not clean | Improper draining<br>Moisture absorption | Exposure to heat and/or light (sunlight) | Blower or dryer<br>Good drainage<br>Ventilation |
| Yellow | Yellow color | Old age, improper use of lodophor<br>Hand soil stain | None | Proper product application<br>Replace |
| Brown - Black | Brown discoloration | Rubber migration<br>Carbon from motors on dryers | Acid wash - if not removed, replace | 1. Acid rinse<br>2. Proper filtration<br>3. Segregation -- of plastics and rubber<br>4. Replace |

## INFORMATION SHEET

| FILM/DEPOSIT | DESCRIPTION OR IDENTIFICATION | *CAUSE | REMOVAL | PREVENTION |
|---|---|---|---|---|
| Red | Red color-stain | Serratia marcescens | None | Proper procedures - on regular basis |
| Pink -- Purple | Pink-Purple color | Streptococcus rubrireticuli | Strong alkaline wash | Proper procedures on regular basis |

* After continuous use, periodic replacement of plastic materials is necessary.

Prepared by the Farm Practices Committee of the International Association of Milk, Food, and Environmental Sanitarians under direction of Richard Rintelmann, Klenzade Products.

1:68:200

# DAIRY PRODUCTS
# UNIT VI

## WORKSHEET--THE CLEANING AND SANITIZING OF DAIRY EQUIPMENT

1. What is the fundamental purpose of cleaning dairy equipment?

2. Define organic soils.

3. Why should cleaning of equipment and utensils begin immediately after use?

4. Define mineral soils.

5. What causes milkstone?

6. Why is an accurate water analysis needed to prevent mineral soils?

7. What is the primary purpose of alkaline cleaners?

8. Define:

    a. emulsifier

    b. dispersant

    c. deflocculant

    d. synergist

9. What is the function of an acid cleaner?

10. List the 4 factors affecting the function of cleaners.

    a.
    b.
    c.
    d.

11. What results when there is:

    a. a low concentration of a cleaner?

    b. a high concentration of a cleaner?

12. At what temperature do dairy cleaners become ineffective?

13. Explain the following cleaning procedures:

    a. Pre-rinse

    b. Washing

WORKSHEET (continued)

    c. Rinse
    d. Storage

14. Define:
    a. Sanitization
    b. Sterilization
15. Explain the two sanitizing procedures:
    a. Heat
    b. Chemicals
16. What are molds?
17. Where is mold growth likely to occur?